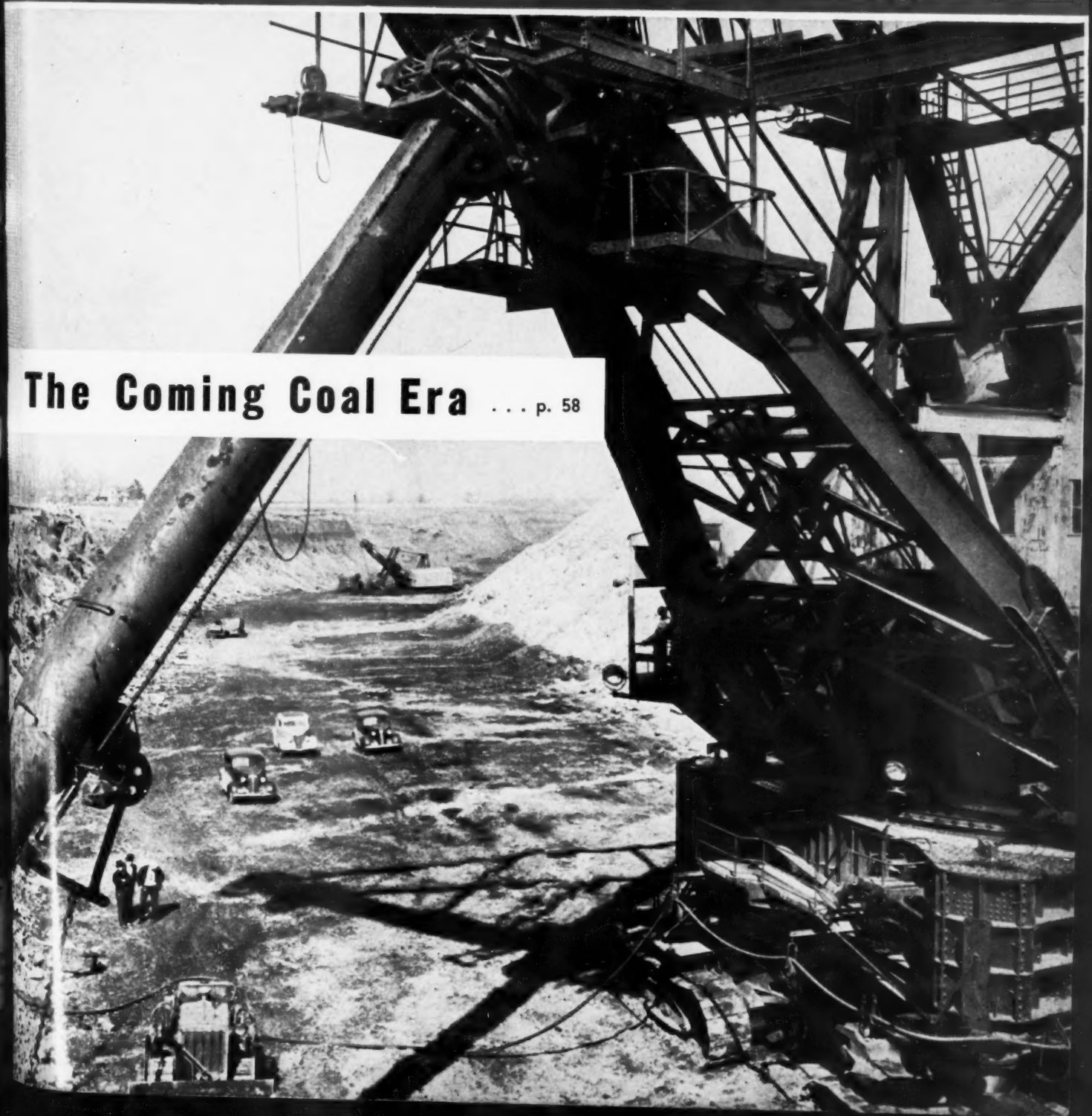
Coal Age

MARCH, 1944



The Coming Coal Era . . . p. 58

10-YEAR RECORD *Still Stands*

SUN MINE LUBRICANTS

keep costs down 20%...with fewer wheel replacements

Mine car lubricants must often do their jobs under severely adverse conditions — and they have to work harder than ever today to keep the coal rolling out to American Industry.

High grease consumption for lubricating plain car wheel bearings was the problem of one eastern coal producer. The grease formerly used was fairly satisfactory, but lubrication and maintenance costs were far above normal.

Ten years ago a Sun Engineer suggested a trial of Sun Mine Car Grease. Performance records have been kept accurately ever since, and these records show a saving of 20% in the amount of Sun Lubricant needed as compared with the former grease. Operating costs have been lower and the need for wheel replacements minimized.

No other grease has done as well in the ten years since this operator started using the Sun Lubricant. Competitive greases have been tested at regular intervals, but none of them has improved the performance of Sun Mine Car Grease.

This 10-year record is one more example of the way in which Sun Mine Lubricants are saving equipment, time and money in a field where conditions are tough on any lubricant.

If you have a lubricant problem for which there seems to be no answer, a Sun Engineer may be able to help you by recommending the right Sun Lubricant. Just write . . .

SUN OIL COMPANY · Philadelphia 3, Pa.
Sun Oil Company, Limited, Toronto, Canada

SUNOCO

SUN INDUSTRIAL PRODUCTS *HELPING INDUSTRY HELP AMERICA*

TECHNOLOGY DEPT:

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DETROIT

Gas attack in an orange grove

Koroseal is a typical example of B. F. Goodrich development

Poison gas will kill the California red scale, an insect that attacks trees and fruit, ruining crops. But to kill it, the gas has to be held in some way around each tree. Canvas tents over individual trees were tried. But they weren't gas-tight. Coated fabrics were tried. But they couldn't stand the California sun. They cracked — and leaked.

University researchers asked B. F. Goodrich men for suggestions. B. F. Goodrich had Koroseal, the flexible material made from limestone, coke and salt which had been used as a waterproof fabric coating for shower curtains, baby pants, and other things. They knew it wouldn't harden and crack, that it wasn't affected by sunlight — or by air, water or most chemicals. A fumigation tent of Koroseal-coated cloth was made. After two years it's still in service, with no sign of cracking or checking. Gas leakage is practically eliminated, resulting in a better kill of the scale with only 1/3 the gas needed for the canvas tent.

Koroseal coatings on umbrellas, raincoats and such things won't get soft and sticky even if they're folded up when wet. As a coating on paper or as a transparent film it will have hundreds of new uses, and while Koroseal still can't be sold for home use, it's available for many essential industrial uses now. Reasonable amounts can be used for experiment, and we're glad to discuss possible future products, to help make plans or do development work. Write us if you have any problem for which a covering, coating or flexible material might give the answer. *The B. F. Goodrich Company, Industrial Products Division, Akron, Ohio.*

B.F. Goodrich

RUBBER *and* SYNTHETIC *products*

Koroseal—Reg. T.M.

TO DO ONE THING

and do it

HULBURT
OF PHILADELPHIA
Quality GREASE

upremely well!

Toledo, in Spain, is famous for one thing — the marvelous Toledo sword-blades, for 2,000 years celebrated for their unequalled flexibility and strength.

HULBURT, in Philadelphia, is famous for one product — HULBURT QUALITY GREASE, for over a quarter-century unequalled for the lubrication of coal mine equipment.

HULBURT OIL & GREASE COMPANY

Specialists in Coal Mine Lubrication

PHILADELPHIA . . . PENNSYLVANIA

HOUR AFTER HOUR PHILCO MINE LOCOMOTIVE BATTERIES DELIVER

HIGH VOLTAGE

PHILCO Mine Locomotive Batteries pack an *extra wallop* not only when they're fresh from the charging racks, but throughout the entire working day. That's because Philco Batteries are engineered to deliver *high voltage* and keep right on delivering it hour after hour.

It's this sustained high voltage you get in a Philco that hauls more tons per shift . . . cuts haulage costs per ton . . . keeps the pit cars going at top speed. There's maximum capacity in a Philco, too—coupled with long productive life. Together these Philco features add up to the best battery you can buy for today's mining service.

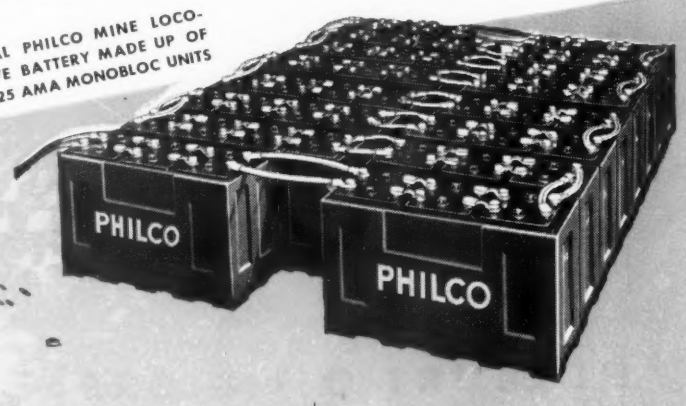
For new equipment or replacements, get the facts on Philco Mine Locomotive Batteries!

Philco Corporation, Storage Battery Division, Trenton 7, N.J.

Specify

PHILCO MINE BATTERIES

TYPICAL PHILCO MINE LOCOMOTIVE BATTERY MADE UP OF TYPE 25 AMA MONOBLOC UNITS



Coal Age

IVAN A. GIVEN

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Louis C. McCarthy — Fred W. Richart
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Maj. Charles H. Lambur. Jr. *(on leave)*
Paul Wooton

ALFRED M. STAEHLE, *Publisher*

A McGRAW-HILL PUBLICATION

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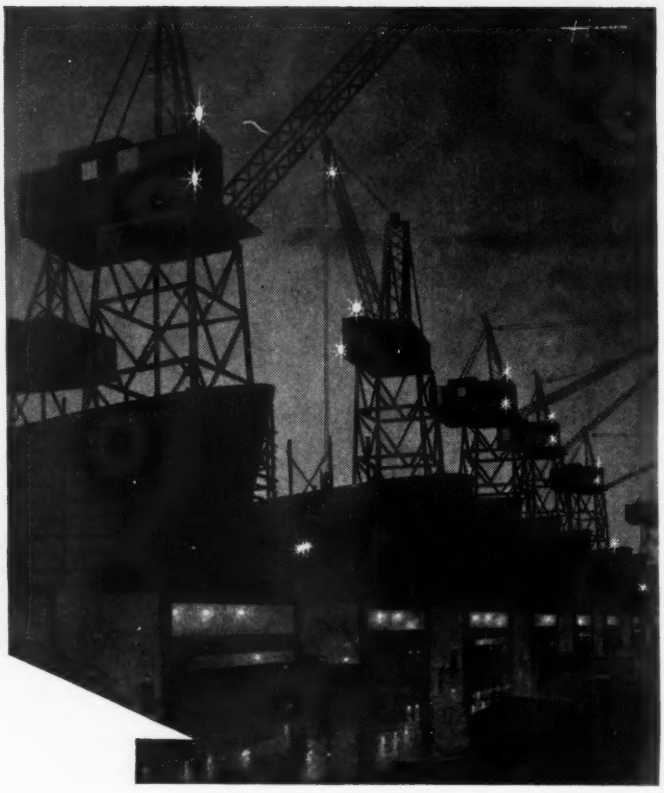


WHY
Form-Set Purple Strand is still hard to get

No need to tell wire rope users that wire rope is hard to get.

You've been telling *us!*

But perhaps you'd like to know why, when consumers of some other products are looking toward easing of restrictions, wire rope is still tight. Here are some of the reasons:

The shipbuilding program, with its emphasis on landing craft, will continue to make heavy inroads on wire-rope production. And so, of course, will the year's stepped-up military and naval operations. Further, the country's 1944 oil program contemplates an increase of from 18,000 to 24,000 wells — and for wells so much deeper than ever before that oil-country demands for wire rope will leap upward from 80 to 100%.

We therefore make this suggestion: Figure your wire rope needs (and place your orders) as far in advance as possible. This offers the best assurance that the wire rope you are going to need through the year will be on hand when you need it.

And while you're thinking about wire rope, think of Form-Set Purple Strand.

★ ★ BETHLEHEM STEEL ★ ★

"Purple Strand" means that the rope is made of "Improved Plow" steel, the strongest, toughest steel used in wire-rope manufacture.

"Form-Set" means that the wire rope is preformed, making it not only rugged but far easier to handle. Preformed wire rope gives longer service because it is much better able to stand bending fatigue.

Form-Set Purple Strand is Bethlehem's top-quality wire rope. It is made in all sizes and constructions. For the utmost in flexibility and ruggedness, and long service life, call for Form-Set Purple Strand.

BREAKS UP THE COAL

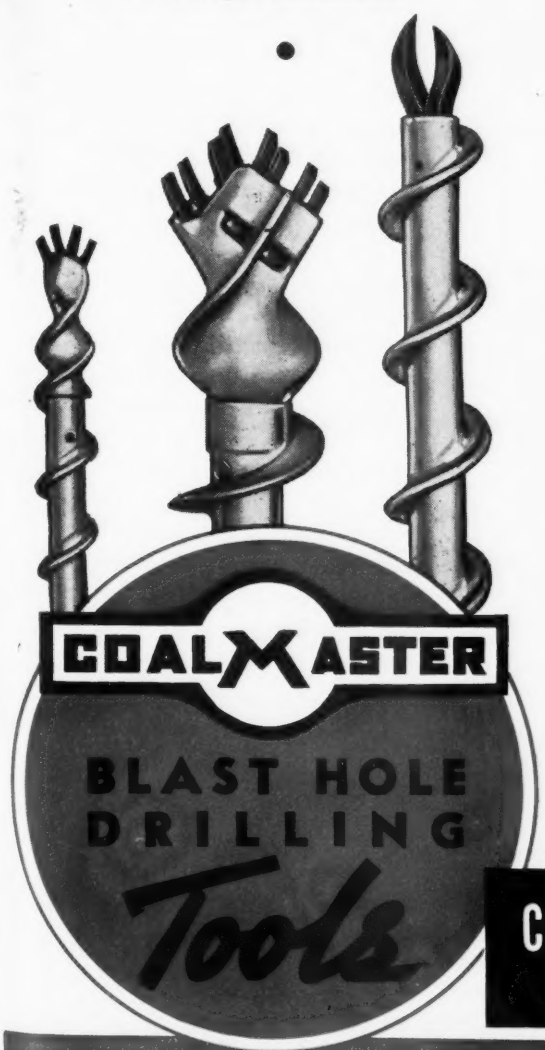
Cleans the blast-hole quickly and with minimum effort....

★ COALMASTER staggered bit positioning starts and drills holes quickly, easily. The coal is broken up—not pulverized.

Rigid conveyor type design drills straight holes without choking. Holes are cleaned automatically.

COALMASTER Equipment gives you maximum results in "Complete Matched Sets." Merely state explosive type and size and hole diameter desired—COALMASTER provides a drilling assembly to match.

Holes smoother and straighter.
Vibration lessened.
Power consumption decreased.
Longer auger life.
Drilling time reduced.
Driller fatigue minimized.



Tools for Hand Drills

The COALMASTER Safety Hex Shank and Drill Socket protects the driller and speeds production.

Tools for Post and Machine Mounted Drills

COALMASTER drilling tools are made for all powder sizes to 2"—all Cardox and Airdox shells to 3-9/16" — All Hydraulic cartridge requirements.

Tools for Strip Pit Drills

The COALMASTER Hexanspeed Coupling is foolproof—a quick make and break connection for fast, accurate hole production—with resultant economy.

CENTRAL MINE EQUIPMENT CO.
ST. LOUIS, MO.

What powers most of America's WAR PROGRAM?

The answer is bituminous coal.

America's war program wouldn't get very far without it.

Bituminous coal is used in making practically 100% of all steel.

It supplies 65% of the mechanical energy required to run the machines that make the guns, tanks, planes and other arms and war equipment.

It supplies the power for 94% of the nation's locomotives.

It provides in whole, or in part, the basic materials for all high explosives, and the four most important war chemicals.

85% of all war plastics require processed bituminous coal as a base.

And in addition to all this – and more – 41% of the homes in the United States depend on bituminous coal for heat.

No wonder the annual value of the bituminous coal mined in this country exceeds the value of all metallic minerals combined.

Bituminous coal is a great fuel. We're proud to belong to the industry which mines it. We aim to live up to our responsibilities to our country, to our customers and the men who work in our mines.

★ ★ ★

BUY MORE WAR BONDS

"What do you want to know about the Coal Industry?"

That's what we asked thousands of people throughout the nation, and here are our answers to two of their questions.

How much coal is produced in a year?

During 1943 our bituminous mines produced 589,000,000 tons, the greatest volume ever mined in one year in any country. During the past six years our bituminous mines have produced a total of 2,883,320,774 tons. The yield in 1943 would have been 40,000,000 tons greater had it not been for strikes.

Why are the miners always striking?

They aren't. It only seems that way, because anything that happens to an industry as important as the Coal Industry gets widespread publicity. Rarely does a strike occur except about the time a new contract comes up—and that is at two-year intervals. Strikes in the coal mines are likely to be more spectacular than frequent. This also exaggerates their frequency in the public's memory. We look forward to the day when there won't be any strikes at all!

BITUMINOUS COAL *Institute*

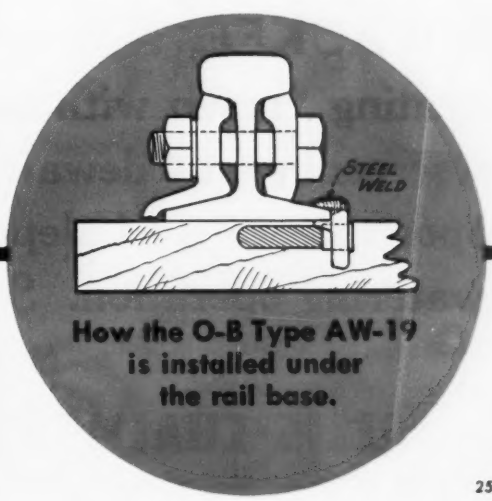
60 East 42nd Street New York 17, N.Y.

Get Maximum Rail Circuit Protection —Meet Wartime Copper Restrictions

with O-B TYPE AW-19 Rail Bond

Short "U"-Type Bond Offers Four Major Advantages to Those Operators Who Prefer Welded Bonds for Main-Line Haulage

1. Requires but 1/4 as much copper strand as a long, around-the-joint-plate bond.
2. Eliminates need for copper-coated welding rod—applied to rail with only 20 lbs. of steel rod per 100 bonds.
3. Positioned on rail so strand extends under rail base—protected from damage by dragging equipment or derailments.
4. May be installed on any rail 50 lbs. and heavier—limited only by its requirements of a suspended joint and 1/2-inch of base extending outside joint plate.



How the O-B Type AW-19 is installed under the rail base.

Ohio Brass

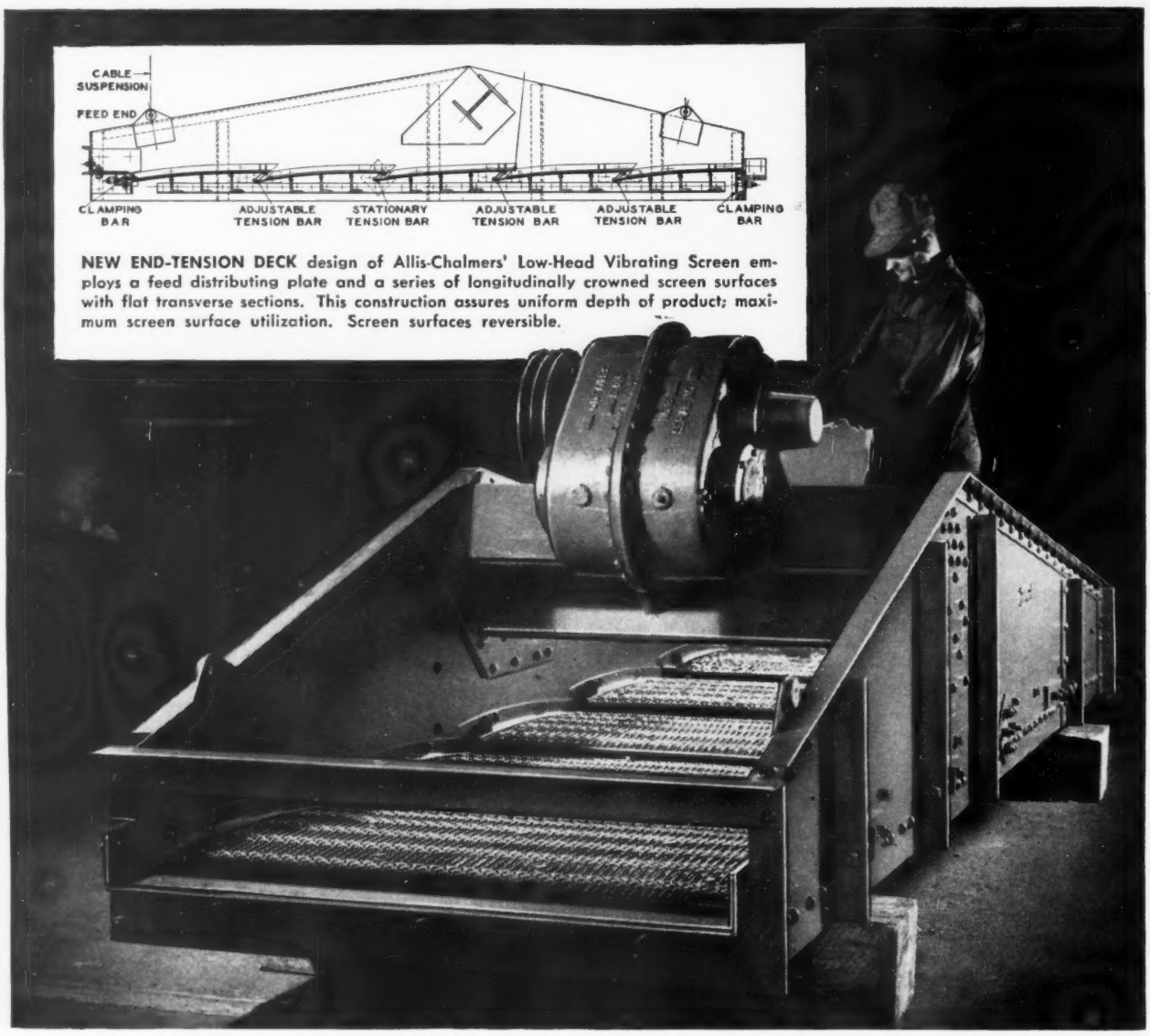
MANSFIELD, OHIO

Canadian Ohio Brass Co., Ltd., Niagara Falls, Ont.

KEEP BUYING WAR BONDS

2502-M

PRODUCT OF THE MONTH



NEW END-TENSION DECK design of Allis-Chalmers' Low-Head Vibrating Screen employs a feed distributing plate and a series of longitudinally crowned screen surfaces with flat transverse sections. This construction assures uniform depth of product; maximum screen surface utilization. Screen surfaces reversible.

5 by 16 ft. Low-Head Screen with End-Tension Deck to be used as primary screen in Sink-Float plant.

MILWAUKEE, WIS.—Allis-Chalmers announces Low-Head Vibrating Screen with new End-Tension Deck developed for wet screening and dewatering. Rubber-covered screen surface supports serve as independent drip strips — assure efficient dewatering operation. Send for Bulletin B-6321.

A 1714

WE WORK FOR VICTORY — WE PLAN FOR PEACE

ALLIS-CHALMERS · MILWAUKEE · WISCONSIN

Tune in the Boston Symphony, Blue Network, Saturday at 8:30 pm, EWT.

BOY! HAVE I BEEN PLACES!

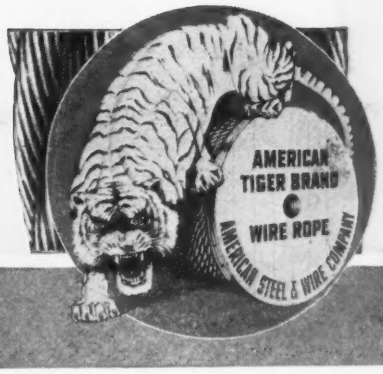
Tiger Brand has been scarce on the home front . . . for military reasons only

BECAUSE we are the world's largest manufacturers of wire rope, it was logical for Uncle Sam to turn to us early for help in supplying the huge tonnages of wire rope needed for the war effort. To date, American Tiger Brand Wire Rope has been used in breath-taking quantities on every front.

As new and unusual service tasks had to be faced, our engineers produced the right wire rope to meet them. Our plants were kept running around the clock. Production facilities were expanded again and again to keep pace with wartime needs.

Now a growing amount of Tiger Brand is becoming available for use here at home. This wire rope incorporates all the improvements that war-stimulated advancement in rope-making technique provides. So, when you need rope—and want the best—get in touch with your Tiger Brand distributor.

Excellay Preformed



AMERICAN STEEL & WIRE COMPANY
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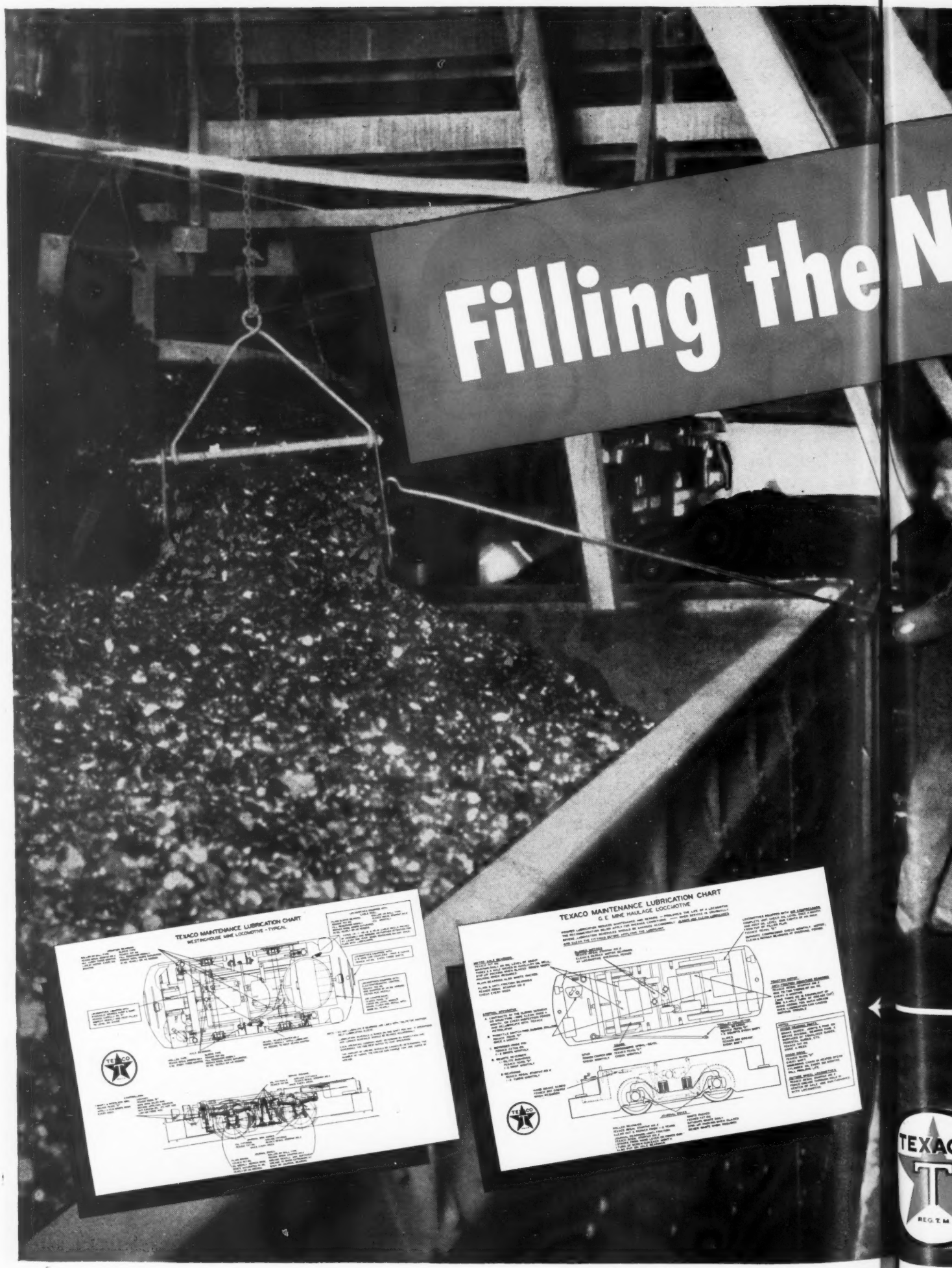
UNITED STATES STEEL


Filling the N
TEXACO MAINTENANCE LUBRICATION CHART
WESTINGHOUSE MINE LOCOMOTIVE - TYPICAL
TEXACO MAINTENANCE LUBRICATION CHART
G. E. MINE HAULAGE LOCOMOTIVE

Nation's Coal Bin

UNCLE SAM'S 1944 requirement of 686 million tons will necessitate keeping every piece of mining machinery constantly on the job.

Operators everywhere are finding they can increase output of their equipment by lubricating it with Texaco.

Texaco Regal Starfak, for example, lubricates and protects anti-friction bearings. It does not separate or leak out even when operating at high temperatures. It remains soft and pliable and easy to handle at low temperatures. Leading manufacturers of mining machinery approve its use.

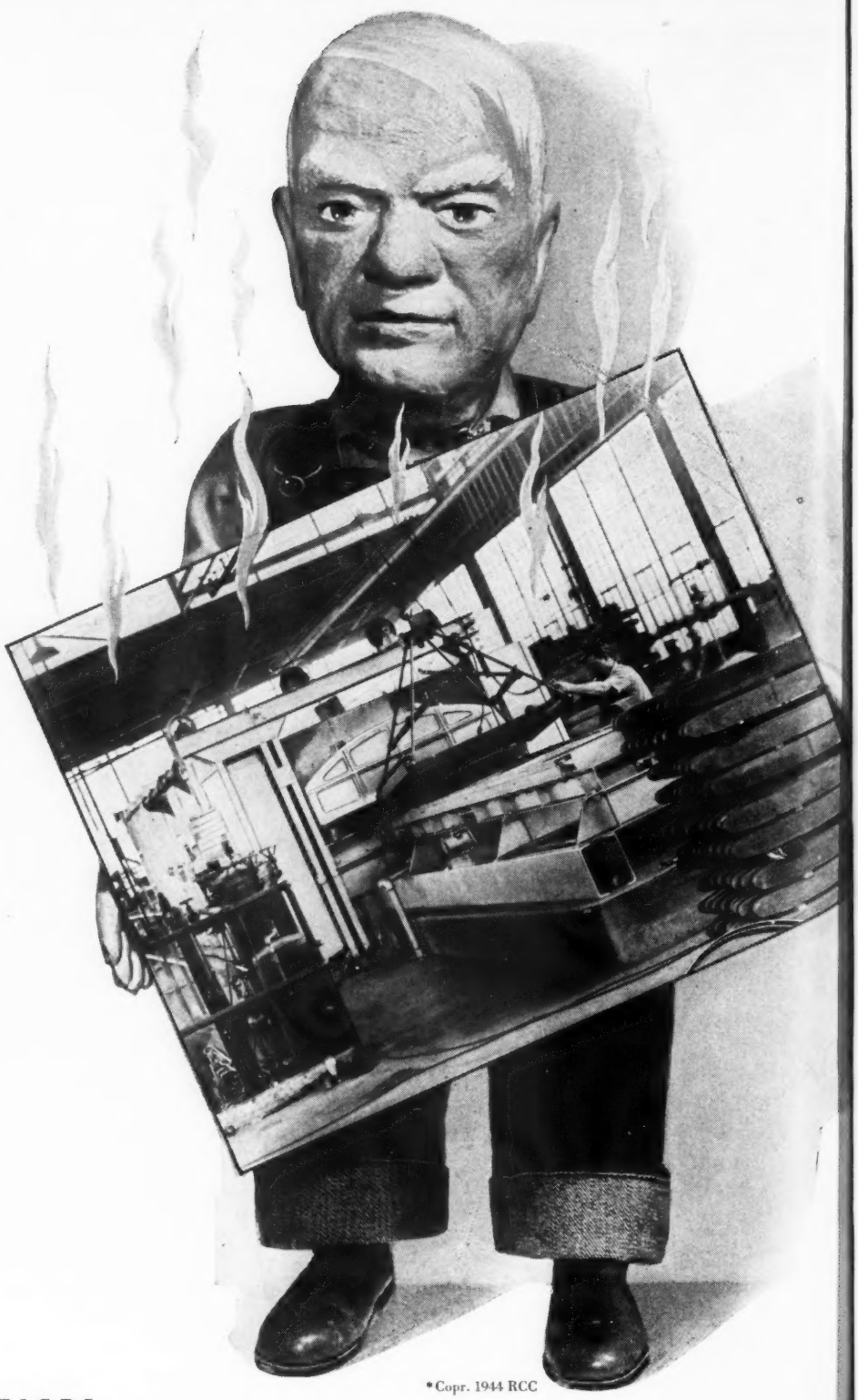
Texaco Lubrication Engineering Service is available to you through more than 2300 Texaco distributing points in the 48 States. The Texas Company, *National Sales Division, Dept. C,* 135 East 42nd Street, New York 17, N. Y.

Texaco Maintenance Lubrication Charts show clearly not only *where* to use *Texaco Regal Starfak,* but also *when* and *with what* lubricant to service each lubrication point in all leading makes of cutters, loaders, locomotives, etc. Order the Charts you need by make and model.

TEXACO

TEXACO Lubricants

FOR THE COAL MINING INDUSTRY



"Whew – is this hot?"

says *Romey

The last word in heating equipment, it brings the copper up to exact temperature for proper rolling, with unfailing accuracy.

It's just one of the many reasons why we are able to produce good wires and cables.

Send us your inquiries.

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See Your Telephone Directory

FROM BAR TO FINISHED WIRE

ROME CABLE CORPORATION

ROME • NEW YORK

NOTES TO DRILLERS and Shot-Firers

A Home-Made "Buggy" That Saves Many Trips

Used for Carrying—

DRILL • DRILL STEEL • BUG-DUST SHOVEL
TAMPING BAR AND DUMMIES
PICK, SHOVEL, BAR • EMERY WHEEL

Construction

A–Build 2′ or less in over-all width to go through cross-cuts or break-throughs, between timbers or around mining equipment.

B–Underslung axle

C–Old auto wheels

D–As light as possible

Every idea that can save time, labor and equipment in these days of shortages is worth using. Here's an idea that has been found practical in many mines. And that is where synergism* enters the picture for blasters.

When Atlas Representatives are called in on a blasting problem they apply synergistic thinking—so that "2 + 2 = 5" results are bound to be achieved. They analyze the "lay of the land," discuss every idea back and forth with the customer—thus evolving the *one* answer: The *right* permissible and the *right* blasting method which will produce the best possible results on that particular job.

Have YOU a blasting problem you'd like us to tackle? Get in touch with Atlas.

Synergism:** ***The force that produces "2+2=5" results when both you and we get together and really "click."

ATLAS EXPLOSIVES
"Everything for Blasting"

CHEMICALS ATLAS EXPLOSIVES

ATLAS POWDER COMPANY, Wilmington 99, Del. • Offices in principal cities • Cable Address—Atpowco

WANT HIGH-TONNAGE HOISTS wit

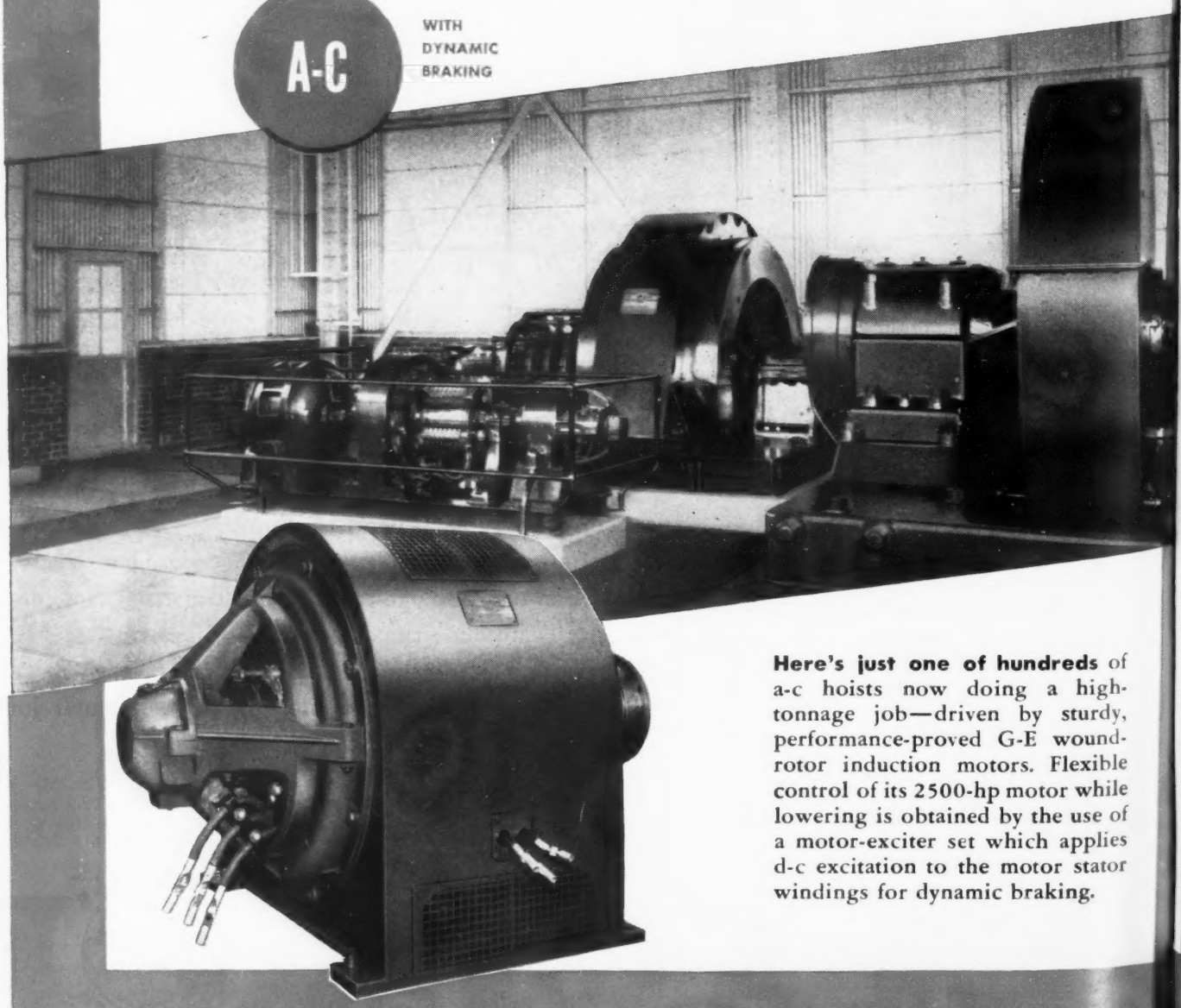
Choose one of these

IMPROVED G-E DRIVES

New engineering advances in G-E drives mean extra tonnage from mine hoists. These advances include amplidyne control of generator voltage actuating d-c hoist motors, and improved dynamic braking of a-c hoist motors. They permit full utilization of motor capacity for fast acceleration and high-tonnage loading, with a control system involving fewer contactors and relays. Before you plan a hoist installation, or modernize an old one, call for the aid of G-E engineering specialists and take advantage of their practical experience on hoists of every type, speed range, and capacity.

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y.

A-C WITH DYNAMIC BRAKING

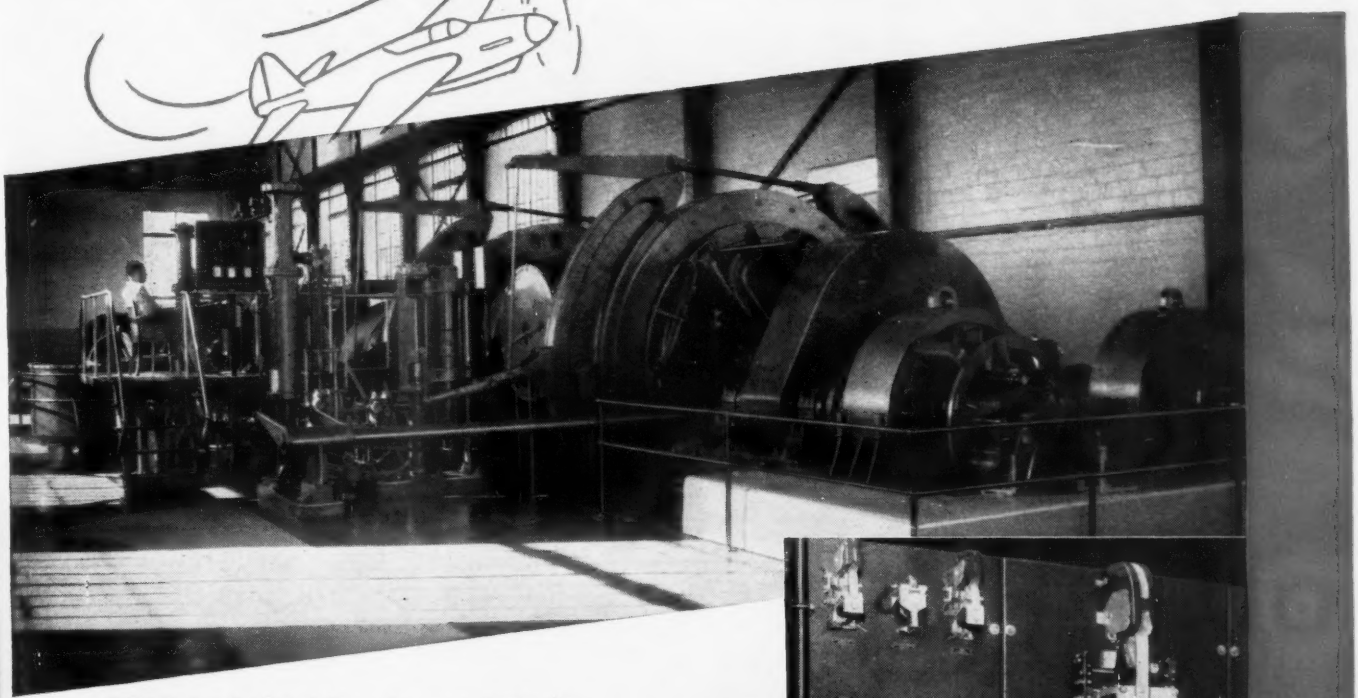


Here's just one of hundreds of a-c hoists now doing a high-tonnage job—driven by sturdy, performance-proved G-E wound-rotor induction motors. Flexible control of its 2500-hp motor while lowering is obtained by the use of a motor-exciter set which applies d-c excitation to the motor stator windings for dynamic braking.

Typical 1000-hp, 2200-volt, wound-rotor induction motor for mine-hoist drive

Every week 192,000 G-E employees purchase more than a million dollars' worth of War Bonds.

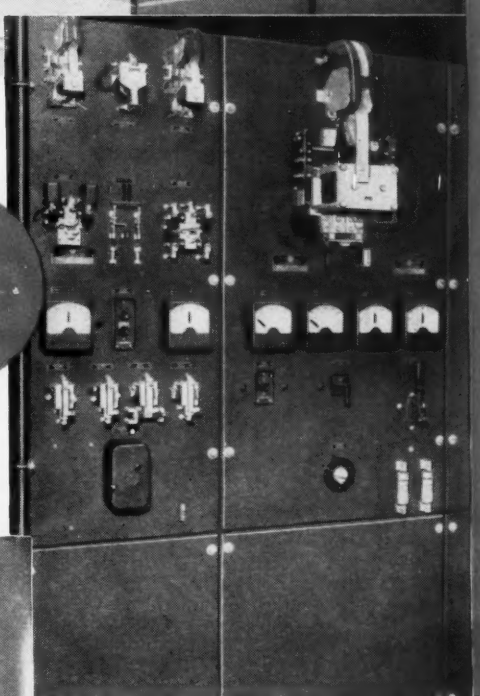
with PURSUIT-SHIP RESPONSE?

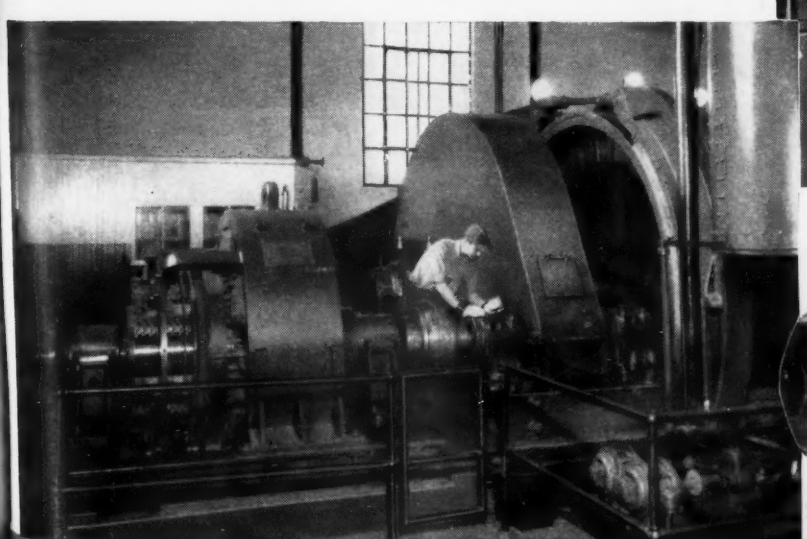


A new 2000-hp hoist driven by two 1000-hp, geared, d-c motors which will raise 38,000 pounds of ore at the rate of 2000 feet per minute. The motor-generator set supplying power to these motors is controlled by a G-E amplidyne, giving "pursuit-ship" acceleration response without a complex contactor setup. (Below) Hoist directly driven by a G-E motor which was recently modernized to increase capacity by the use of amplidyne control.

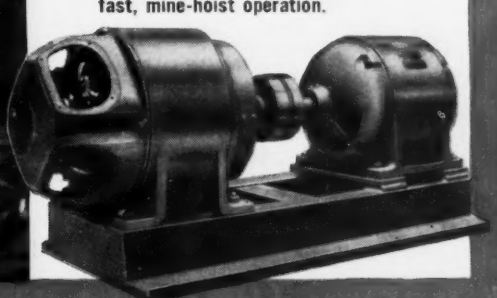
D-C

WITH AMPLIDYNE CONTROL





Simple control panel used with G-E amplidyne (below) for smooth, fast, mine-hoist operation.



GENERAL ELECTRIC

Power And Speed For QUICK ACTION

On the War Front

No breakdowns...no letdowns...when *quick action* is needed with Koehring simple controls and smooth operation. Quick accessibility makes it easy for the operator of a Koehring Shovel to keep all parts of his machine well lubricated and clean. And smooth operation enables him to maintain top production for maximum output per shift. Keep your Koehring shovel in a natural smooth running condition for the duration. New equipment is now available only to the armed forces or highly essential military construction projects.

Depend on your Koehring distributor to help you keep your equipment operating. Care for your Koehring equipment NOW, so it will serve you tomorrow. Koehring distributors have genuine Koehring parts. Koehring parts warehouses are at your service.

KOEHRING COMPANY • *Milwaukee, Wisconsin*

KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

Let HAZARD EXPERIENCE

. . . help you pick the RIGHT electrical cable

Today there's *less* wire — but *more* variety!

With synthetics now necessarily being used in place of rubber, you're probably confronted with a multitude of unfamiliar wires and cables. Yet Hazard engineers quickly can steer you through this maze to the selection of the proper cable for any installation. And the cables they recommend won't be untested substitutes, hastily developed to meet the wartime emergency.

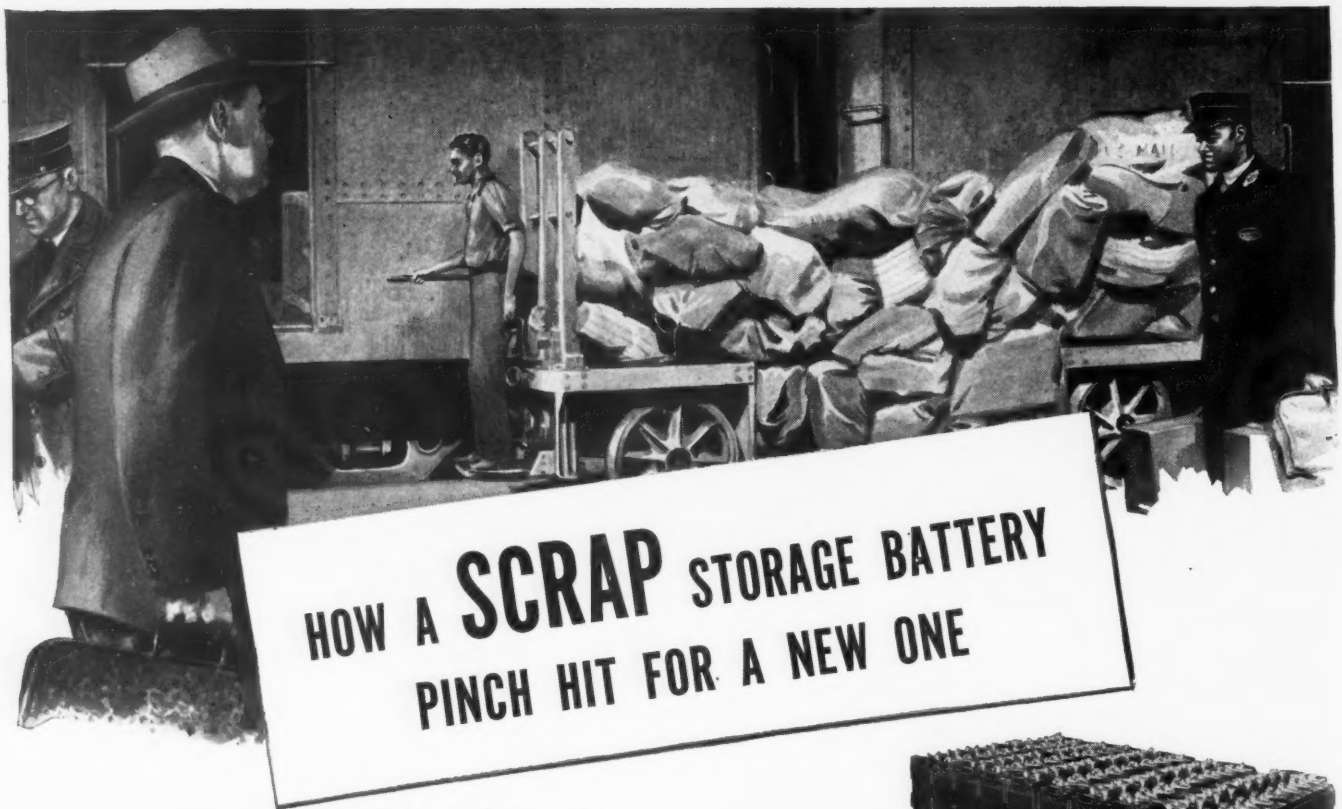
Our study of synthetic insulating and sheathing materials was started *13 years before this war began.* Many of these were developed to supply specific properties (such as resistance to heat, flame, oil, chemicals, etc.) which could not be obtained with conventional materials. Now, through continuing research, these *tested* and *proved* products — further developed and augmented by others — are ready to help keep vital electrical systems functioning at their usual efficiency.

Whatever your particular need, Hazard experience can be your most helpful guide the next time you're specifying electrical wires and cables. Hazard Insulated Wire Works, Division of The Okonite Company, Wilkes-Barre, Pa.

3508

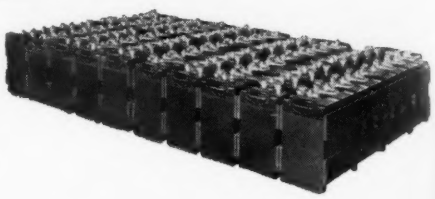
HAZARD

Electrical Wires and Cables



HOW A SCRAP STORAGE BATTERY PINCH HIT FOR A NEW ONE

. . . A Salvage Story for Users of Mine Locomotives and Shuttle Cars



A few years ago, an Edison Alkaline Battery, operating an industrial truck in a New England railroad terminal, was retired from service as "worn out." It had passed the usual "retirement age" and was beginning to show signs of no longer having adequate capacity for the work.

So the electrician in charge issued instructions to have it crated and shipped back to our factory for scrap credit. The battery was crated but in some unaccountable manner was not shipped. Instead, it was sidetracked into a corner of a dead storage room where it remained unnoticed for more than a year.

By lucky coincidence it was discovered again at a time when the terminal happened to be short of industrial-truck batteries. It was uncrated, charged, and put into one of the trucks just to see what it could do. It did so well that it was kept in regular use and was not finally replaced with a new one until more than a year later.

What this incident illustrates, more than anything else, is the fact that even after an alkaline battery reaches the normal end of its useful service life, and no longer delivers its full rated capacity, it is still a dependable power source, not in the habit of failing unexpectedly. Some of the unique characteristics of the Edison Alkaline Battery which account for this great reserve of dependability are cited in the column at the right.

ADVANTAGES OF THE EDISON ALKALINE BATTERY IN MINE LOCOMOTIVES AND SHUTTLE CARS

★ It is durable mechanically. High strength steel construction is used in the containers, grids, pole pieces, etc. The electrolyte is a preservative of steel.

★ It is foolproof electrically. It may be accidentally short-circuited, over-charged, over-discharged, or even charged in the reverse direction without injury.

★ It can be charged rapidly. It does not require critical adjustment of charge rates and, therefore, can be charged directly from the d-c mine power supply. It has no finish-rate limitations. It requires no equalizing.

★ It withstands temperature extremes. It is not damaged by freezing. Free air spaces on all sides of all cells provide ventilation for rapid cooling under high temperature conditions.

★ It is simple to maintain. Merely charge adequately, add pure water, keep clean and dry.

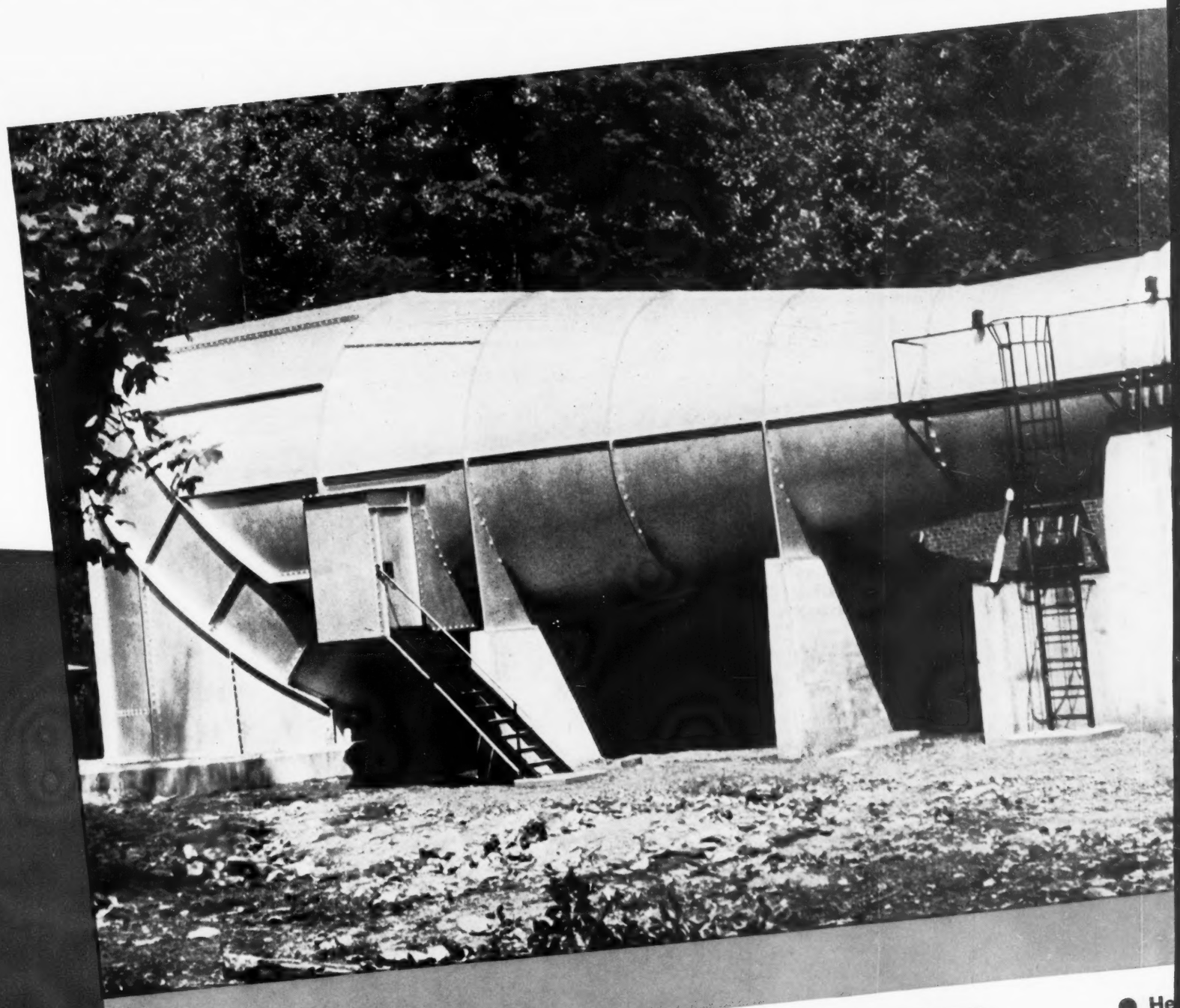
★ Its tray assembly and cell connections are extremely simple.

★ Its life is so long that its annual depreciation cost is lower than that of any other type of storage battery.

EDISON STORAGE BATTERY DIVISION, THOMAS A. EDISON, INCORPORATED, WEST ORANGE, NEW JERSEY

Edison

ALKALINE BATTERIES



JEFFREY AERODYNE FANS & BLOWERS

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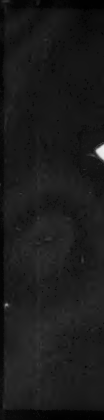
● Here is a typical installation of a type 8-H Aerodyne Mine Fan. This unit has a 117-inch rotor with adjustable pitch blades. Capacity 550,000 cubic feet at 9" W. G. 840 R. P. M. at 1000 B. H. P. Jeffrey has both the engineering staff and manufacturing organization to determine, design, build and install the proper ventilating equipment to provide safe, efficient underground ventilation. Bulletin No. 719 gives complete details as to models, capacities and operating efficiency.



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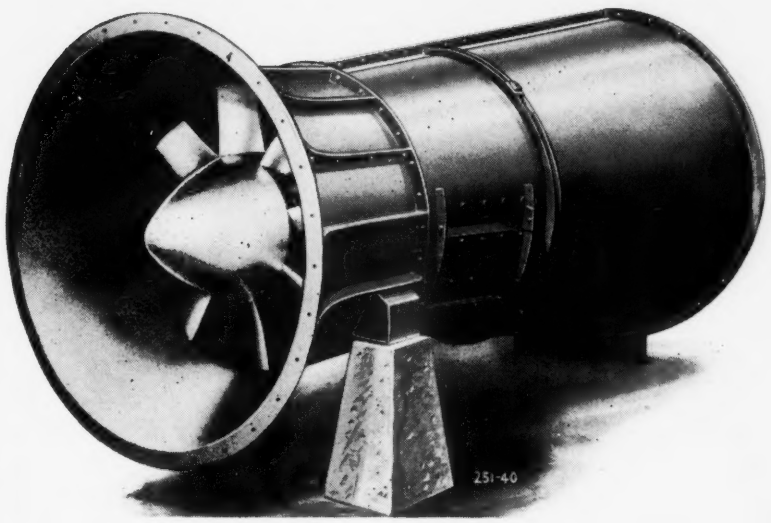
30,000,000,000 cubic feet of fresh air must be distributed below ground – for every shift of workers in U. S. Mines

JEFFREY FANS & BLOWERS

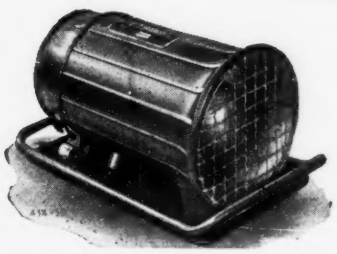
Play an important part in ventilating underground workings



JEFFREY TYPE 8-H AERODYNE FAN

Provides maximum efficiency — safe working conditions — increased employee comfort — accelerated production — greater profit. It features high capacity, adjustable blades, slow speed, pressures up to 10 inches—will maintain high static efficiencies over a wide range of duties. (Patented.)

AERODYNE MIDGET TUBING BLOWER



A small, compact, lightweight, streamlined propeller-type unit of flame-proof construction. Used with flexible tubing for ventilating dead ends, single entries, etc. Ideal for use in conveyorized mines. (Patented) Bulletin No. 739.

4500 TONS OF COAL ARE REQUIRED TO MAKE STEEL FOR ONE DESTROYER

BUY WAR BONDS

of fresh
ground -
S. Mines

WERS
in
kings

) TONS OF COAL
EQUIRED TO MAKE
OR ONE DESTROYER

WAR BONDS

Jeffrey

SERVES THE INDUSTRY
BELOW AND ABOVE GROUND
FROM FACE TO RAILROAD CAR

CUTTERS
DRILLS
LOADERS
LOCOMOTIVES
FANS
CONVEYORS
BLOWERS
JIGS
CRUSHERS
SCREENS
RENEWAL PARTS

THE JEFFREY MANUFACTURING COMPANY

Established in 1877

912-99 NORTH FOURTH STREET, COLUMBUS 16, OHIO

Sales Offices:	Baltimore Birmingham Boston Buffalo	Chicago Cleveland Cincinnati Detroit	Denver Harlan Houston Huntington	Milwaukee New York Philadelphia Pittsburgh	Scranton St. Louis Salt Lake City
Service Stations:	Pittsburgh Harlan, Ky.	Birmingham St. Louis	Logan-Beckley W. Va.	Scranton	
Foreign Plants:	Jeffrey Mfg. Co., Ltd. Montreal, Quebec	British Jeffrey-Diamond, Ltd. Wakefield, England	Jeffrey-Galion (Pty.), Ltd. Johannesburg, S. A.		

FOR FUL
COAL A

—Facts You Should Know about Greases

Are you familiar with the composition of lubricating greases? . . . . . Do you know the different grease types . . . their virtues . . . their weaknesses? . . . . . Are you informed about proper selection and correct application?

This and other information, vital to every industry, is contained in "Lubricating Greases," a new Sinclair brochure published by America's outstanding manufacturer of lubricants.

"Lubricating Greases" by text and chart furnishes you with facts essential to higher production and lower upkeep in individual machine or complete plant operation.

If you are interested in more efficient, more economical lubrication with a greatly reduced inventory of greases you will want a copy of "Lubricating Greases." Write today for a copy—with our compliments.

SINCLAIR INDUSTRIAL OILS

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE SINCLAIR REFINING COMPANY, 630 FIFTH AVENUE, NEW YORK 20, N. Y.

Everything for Pipe Lines - - you can get it from Crane

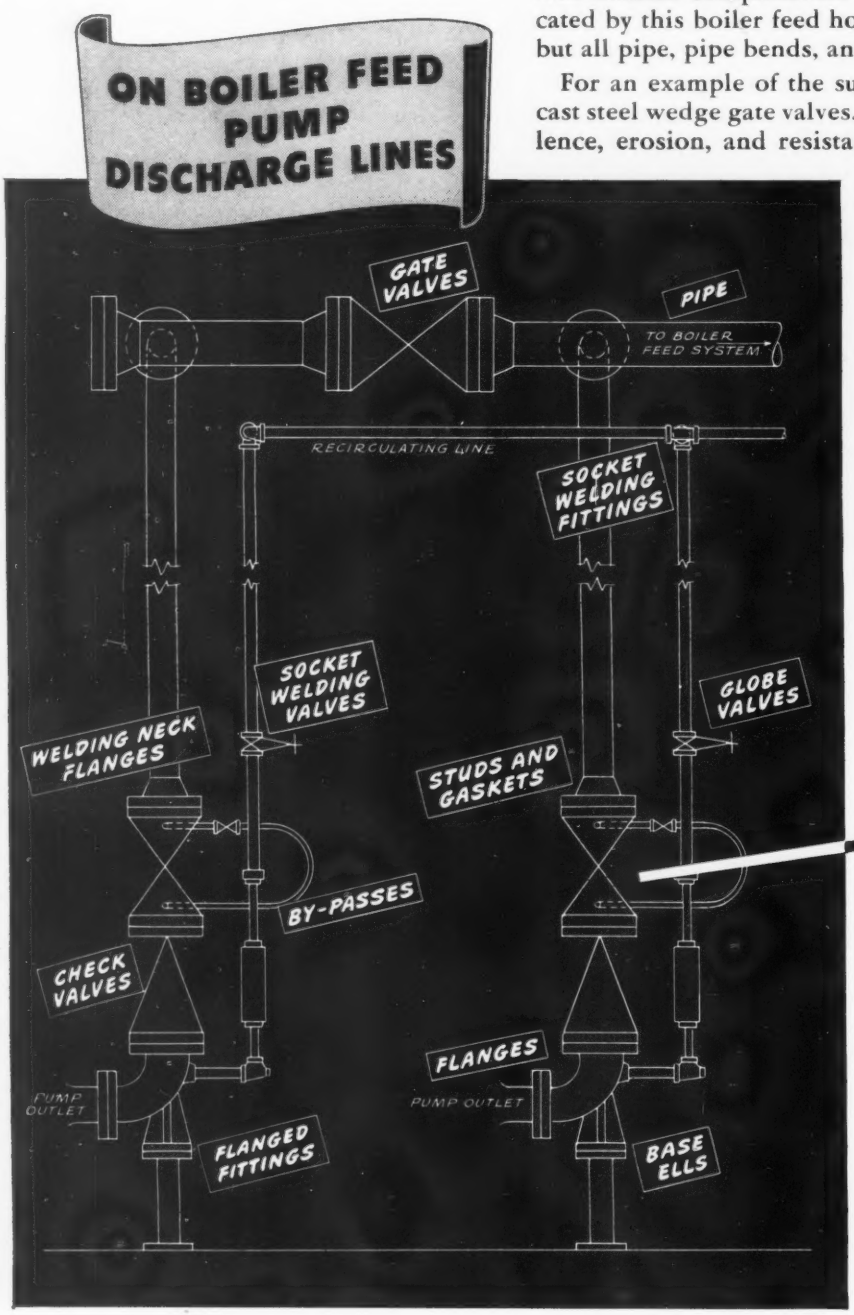
One high standard of quality throughout . . . One source of supply . . . One responsibility for all materials

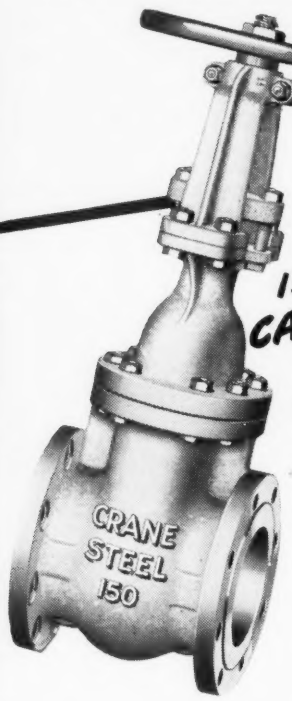
WHEN you need a single fitting or a piping system, you stand a better chance of getting exactly what you need from Crane. The unusual completeness of the Crane line sees to that—as indicated by this boiler feed hook-up. Not only the valves and fittings, but all pipe, pipe bends, and other materials are supplied by Crane.

For an example of the superiority of these materials, take Crane cast steel wedge gate valves. Straight-through ports minimize turbulence, erosion, and resistance to flow. Strong tee-head disc-stem connection, easily lubricated ball-bearing yoke, and ample non-corrosive stem bearings assure smooth operation. The disc is fully guided and accurately seated by extra long guide ribs.

Yet all Crane products have similar characteristics of modern design that mean better performance and greater freedom from trouble. Choose all your piping needs from the world's largest selection—with quality assured by Crane Co.'s 89-year leadership in the piping materials field.

CRANE CO., General Offices: 836 S. Michigan Avenue, Chicago 5, Illinois



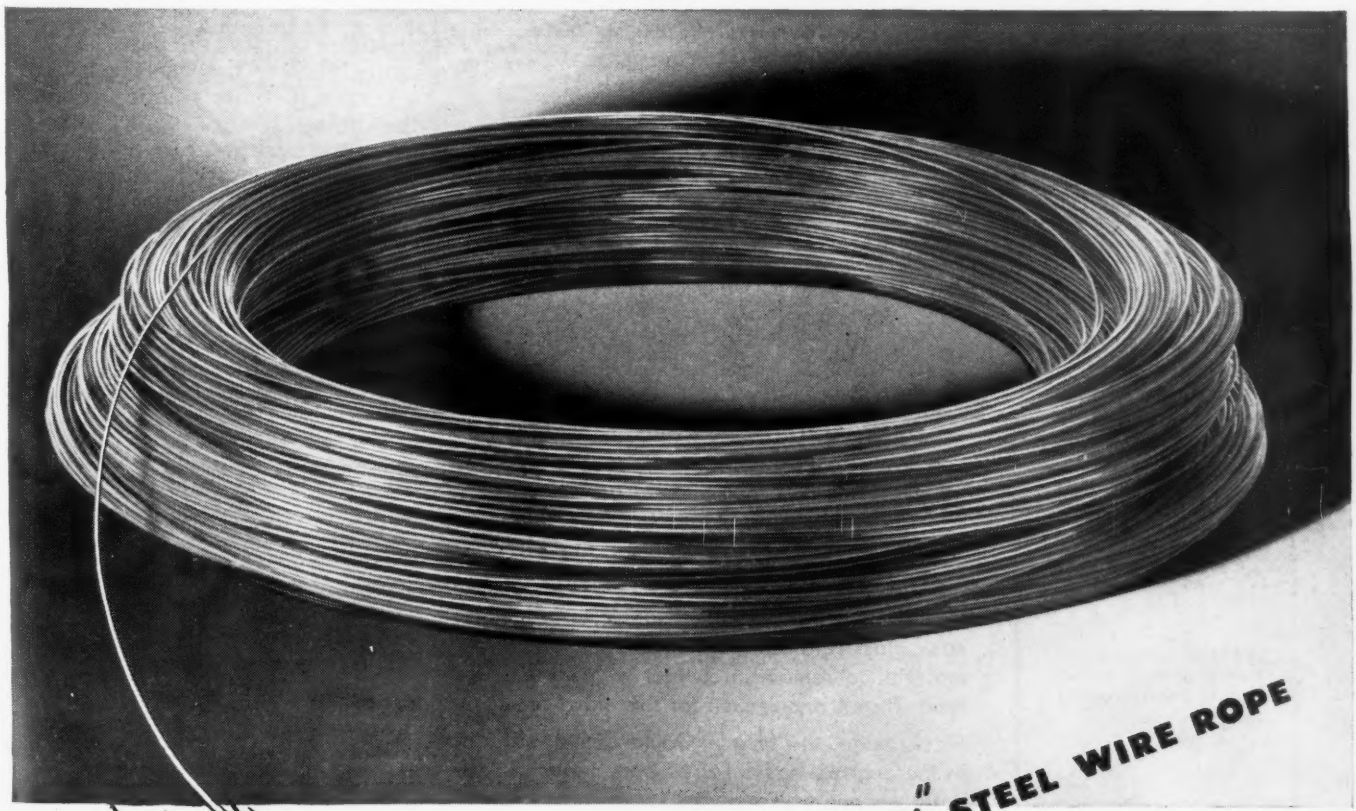


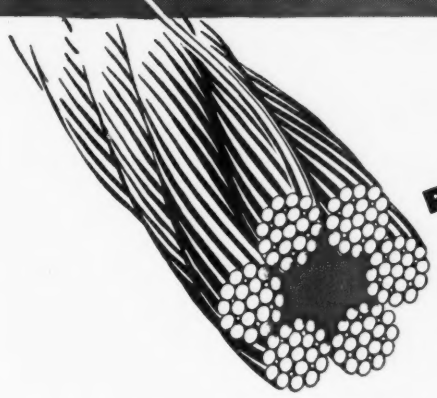
150 POUND CAST STEEL GATE VALVES

CRANE

VALVES • FITTINGS • PIPE
PLUMBING • HEATING • PUMPS

Wire rope can be no better than the individual wires that go into its construction . . . our open hearths, blooming mills, rod and wire mills are all dedicated to the production of specialized wire and wire alone





ROEBLING "*Blue Center*" STEEL WIRE ROPE

WHAT CAN YOU EXPECT from Roebling? Rope that has known capacity to deliver service. Engineering, in our plant and at your job, to put the rope to work right. Maintenance practices that protect its long life. » » Your postwar profits and postwar jobs will depend in part on operating rope-rigged equipment at lowest cost. You can leave that part to Roebling.

JOHN A. ROEBLING'S SONS COMPANY, Trenton 2, New Jersey
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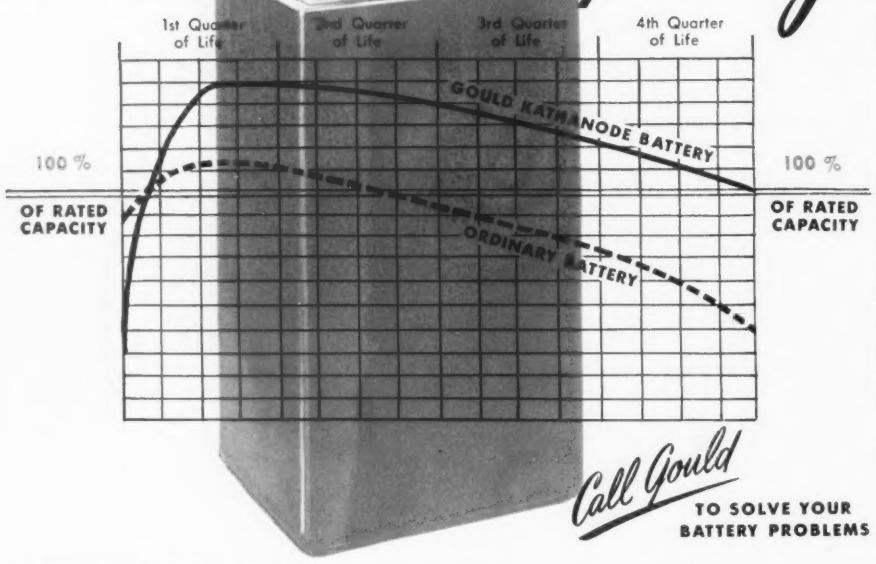
PACEMAKER IN WIRE PRODUCTS

WIRE ROPE AND STRAND • FITTINGS • AERIAL WIRE ROPE SYSTEMS • COLD ROLLED STRIP • HIGH AND LOW CARBON ACID AND BASIC OPEN HEARTH STEELS • ROUND AND SHAPED WIRE • ELECTRICAL WIRES AND CABLES • WIRE CLOTH AND NETTING AIRCORD, SWAGED TERMINALS AND ASSEMBLIES • SUSPENSION BRIDGES AND CABLES

THE GOULD KATHANODE

Exceeds rated capacity

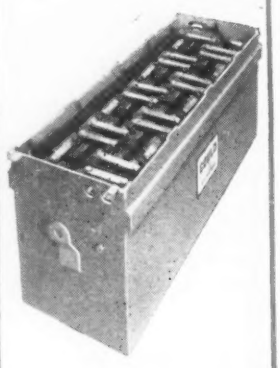


Call Gould TO SOLVE YOUR BATTERY PROBLEMS

Rated Conservatively . . . Goulds equal or exceed in capacity any battery of comparable size and cell structure.

★

Are you receiving the monthly, informative "Gould Battery News"? If not, write for it.



• Here are the capacity ratings of two batteries. The top one is a Gould Kathanode. It starts near catalogue rating. Then, as it is cycled, capacity actually increases to a higher level that is held for the greater part of the battery's useful life.

Gould's special Kathanode grid construction and spun glass retainer mats allow for more active material to remain in contact with the electrolyte. That is one reason for this extra capacity.

Black oxide, the unique Gould active material in these grids, has cores of pure lead. As the outer surface wears away, these cores become new active material to maintain that extra capacity throughout a long battery life. That is why the capacity of the Gould Kathanode increases during the first few years of its life.

You get more when you buy Gould so learn all the facts. Ask for the Gould Kathanode Bulletin, using business letterhead.

GOULD STORAGE BATTERY CORP.

DEPEW, N. Y. • Factories at Depew, N. Y. • North Bergen, N. J.
Zanesville, O. • Dallas, Texas • Atlanta, Ga. • Chicago, Ill.
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FOR EXCELLENCE IN STORAGE BATTERY PRODUCTION AT DEPEW PLANT

GOULD

Since 1898 THE BATTERY PICKED BY ENGINEERS

HOW TEMPERATURE AFFECTS SPECIFIC GRAVITY

One of a series of service suggestions for users of industrial batteries.

◀ In taking hydrometer, or specific gravity, readings of a storage battery the temperature of the electrolyte is an important factor. Few operators, however, take temperature into consideration and, as a result, their readings are not entirely accurate.

This is due to the fact that hydrometer floats are calibrated to indicate correct specific gravity at a certain definite temperature. On the better grades of hydrometers this base temperature is indicated on the scale, and whenever a variation from this temperature occurs a correction must be applied.

The reason for this correction lies in the fact that specific gravity is a relative term. Strictly speaking it is the density, or weight, of a liquid as compared to an equal volume of pure water at 4° Centigrade. This is much too cold for ordinary use so hydrometer scales are usually calibrated at 25°/C. 25° C., which means that the scale has been adjusted to compare the specific gravity of the electrolyte to a similar volume of pure water when both have a temperature of 25° Centigrade, or about 80° Fahrenheit.

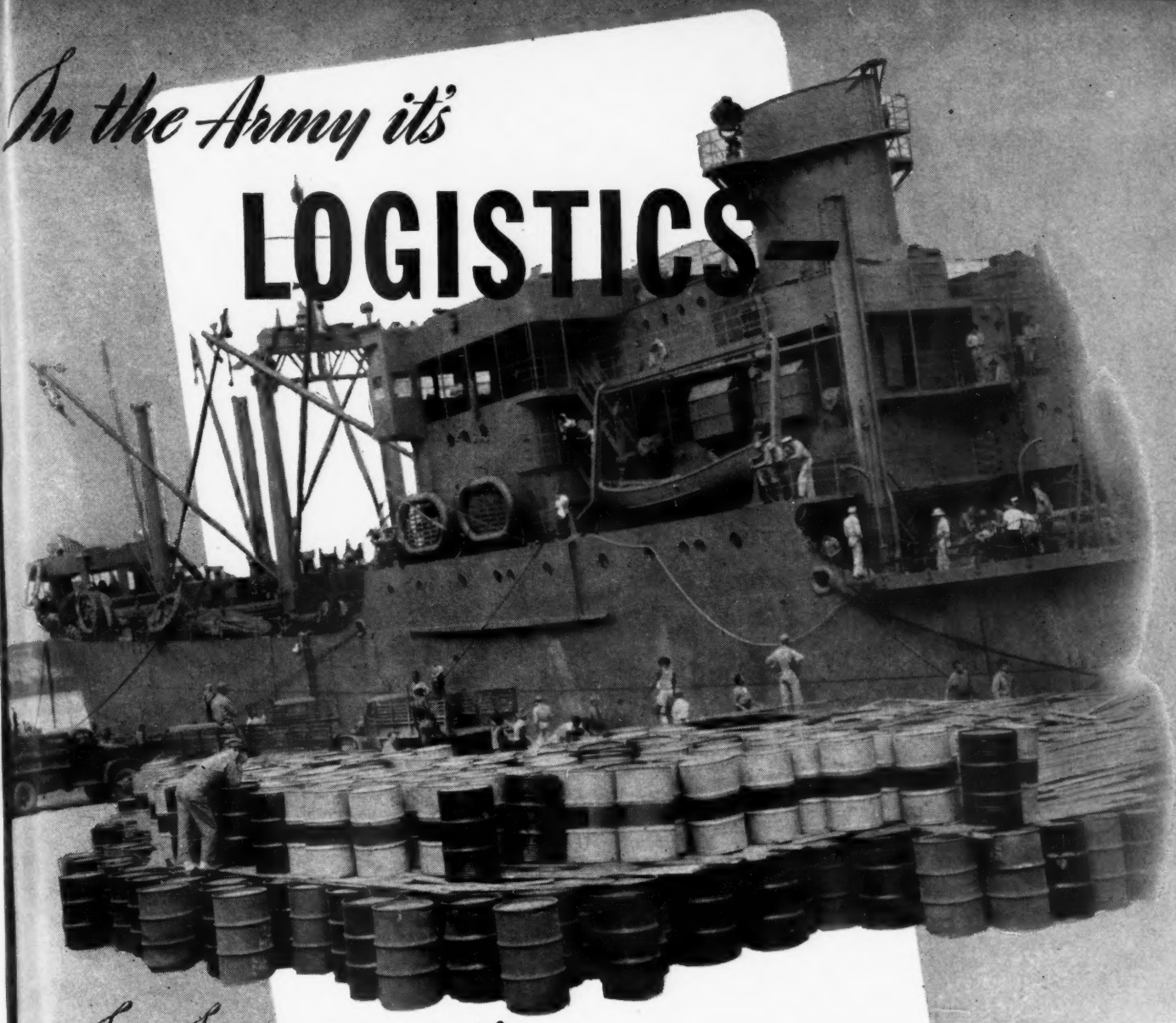
When there is any change in the temperature of the electrolyte from this basic 80° F., it means that you are trying to compare the specific gravity of one solution at a certain temperature to another at a second and different temperature. This is beyond the capabilities of the hydrometer and corrections must be made.

This temperature correction is easy to apply. Just remember that when the temperature is high, the electrolyte has expanded and is not so dense as before. This causes the hydrometer float to ride low and give readings higher than the true reading. Conversely, when the electrolyte is cold the float rides high and gives figures that will err the other way.

To make these corrections add or subtract 3 points of "gravity" (.003) for each 10° F. change in temperature—battery temperature, *not* air temperature. The calibrated point is 80° F. If the temperature is 10° F. above 80° F., add. If below, subtract. Example: A hydrometer reading of 1.250 at 90° F. is really a hydrometer reading of 1.250 plus .003 or 1.253.

In the Army it's

LOGISTICS—



In Industry it's

MATERIAL HANDLING

Getting the RIGHT Material to the RIGHT Place at the RIGHT Time!

• In the army the supply lines are ships, trains, trucks and planes. In industry, they are conveyors and elevators, engineered into efficient material handling systems.

The development of such systems is a job at which Stephens-Adamson has specialized for 42 years. This broad design and manufacturing experience is at your service now—to help you secure a system that will assure fast, safe and economical conveying and elevating of any kind of bulk materials. For the solution to your present or anticipated material handling problems, call on S-A.

STEPHEN S-A ADAMSON MFG. CO.

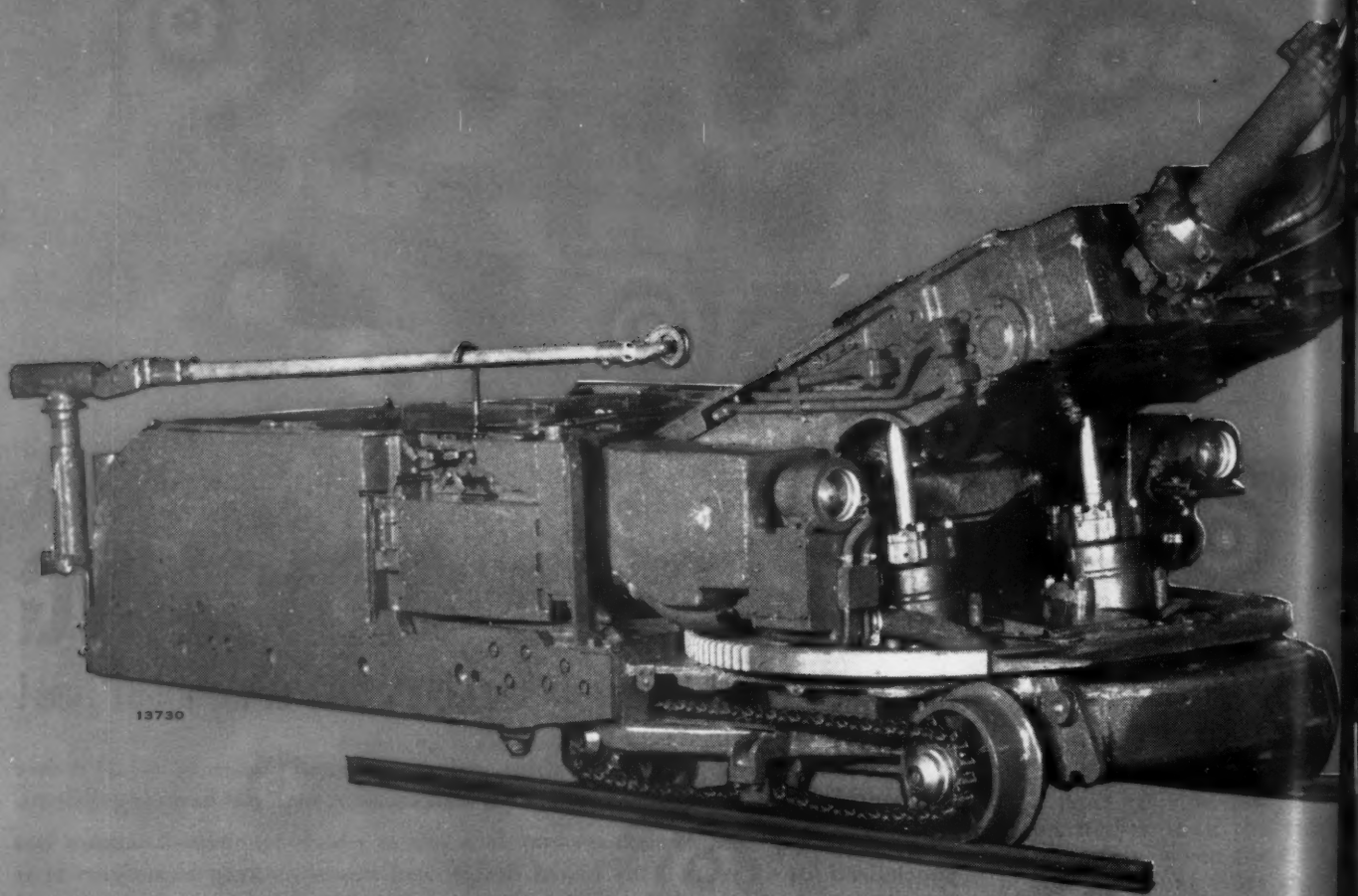
6 RIDGEWAY AVENUE, AURORA, ILLINOIS — LOS ANGELES, CALIF. ★ BELLEVILLE, ONT.

Designers and Manufacturers of All Types of

BULK MATERIAL HANDLING EQUIPMENT

The Goodman

. . . a track mounted cutting machine with full 360 degree rotation of the cutter bar, wide cutting range and easy to operate, quick responding hydraulic controls.



ARMY E NAVY

GOODMAN MANUFACTURING COMPANY

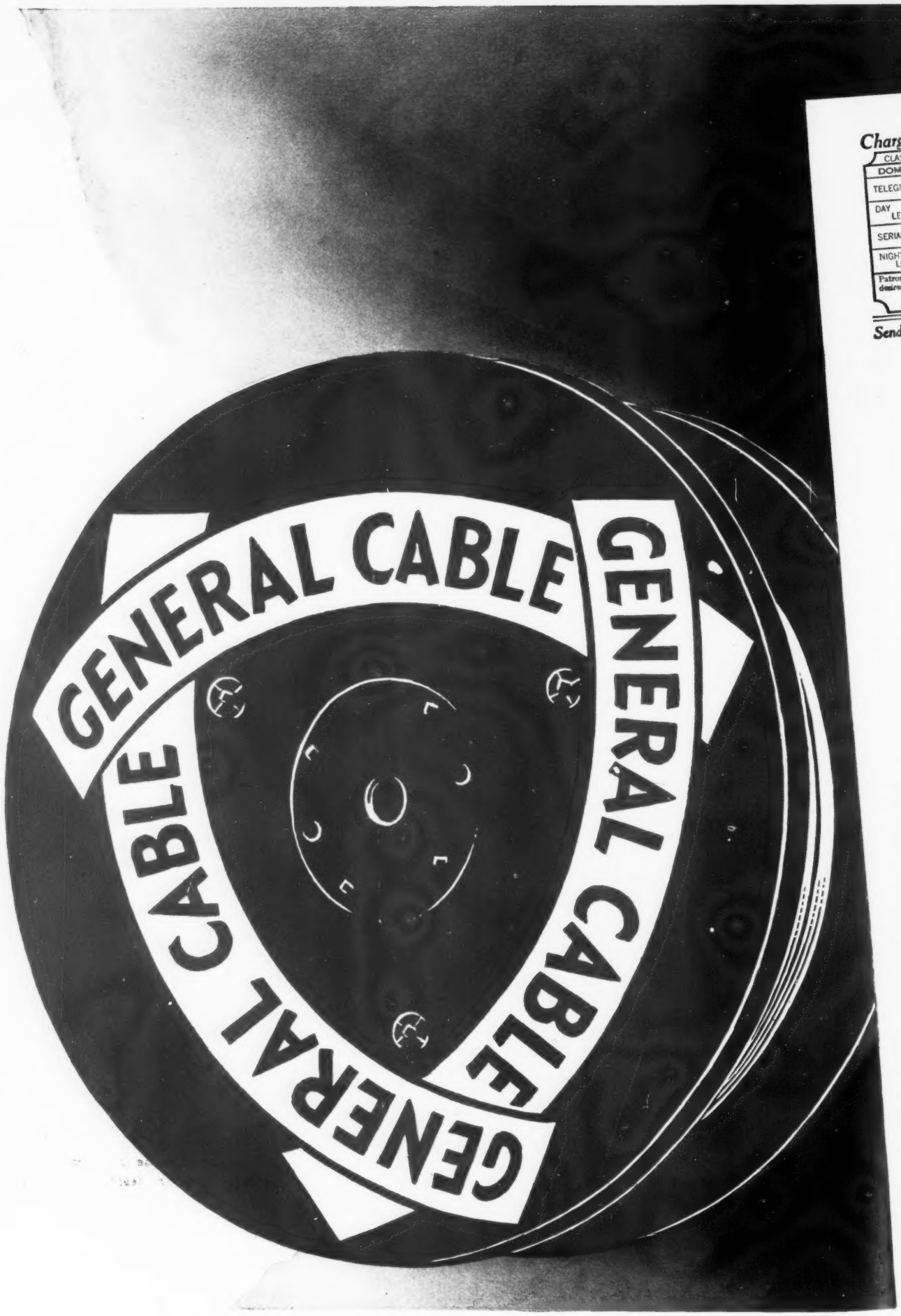
1224

Horisontal cuts can be made from 8 feet above the rail to 9 inches below.

Shear cuts parallel to the track center line can be made up to nine feet to either side.

11731

HALSTED STREET AT 48TH • CHICAGO 9, ILLINOIS



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ACCOUNTING INFORMATION

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A. N. WILLIAMS
PRESIDENT

NEWCOMB CARLTON
CHAIRMAN OF THE BOARD

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FIRST VICE-PRESIDENT

gram, subject to the terms on back hereof, which are hereby agreed to

1944, FEB. 17

TO OUR CUSTOMERS:

CONTINUING OUR SURVEY OF THE PRACTICES, CONDITIONS AND PROCEDURES THAT HAVE BEEN EXISTENT IN THE WIRE AND CABLE INDUSTRY OVER A PERIOD OF YEARS, WE ARE SATISFIED THAT THE ELIMINATION OF SOME OF THESE POLICIES CANNOT HELP BUT RESULT IN SUBSTANTIAL BENEFITS TO ALL BRANCHES OF THE ELECTRICAL INDUSTRY, TO ALL CUSTOMERS AND TO THE GENERAL PUBLIC. AS OUR STUDIES DEVELOP THE NEED FOR CORRECTIVE MEASURES, WE WILL, IN LINE WITH OUR CONSISTENT POLICY, PROMPTLY INSTITUTE SUCH CHANGES AS EXPERIENCE AND CONSIDERED OPINION WARRANT.

AT THIS TIME WE FEEL IT INCUMBENT UPON US TO ASSUME "CLEARANCE OF THE DECKS" IN RESPECT TO REELS, SPOOLS AND CASES WHICH ARE USED FOR THE SHIPMENT OF PRODUCTS OF OUR MANUFACTURE.

EFFECTIVE MARCH 1, ALL GENERAL CABLE CORPORATION CONTAINERS WILL BE SHIPPED ON A "NO CHARGE" BASIS AND NO PAYMENT OR DEPOSIT WILL BE REQUIRED.

WE HAVE CONFIDENCE THAT OPERATION OF THIS PLAN WILL RECEIVE THE SUPPORT AND COOPERATION OF ALL PARTIES AT INTEREST, ELIMINATING AS IT DOES THE PRESENT COSTLY AND MANPOWER-CONSUMING METHOD OF HANDLING CONTAINERS. IT IS REQUESTED THAT ALL GENERAL CABLE CORPORATION RETURNABLE TYPE CONTAINERS BE RETURNED PROMPTLY, FREIGHT COLLECT.

WE WILL ALLOW CREDIT FOR THE RETURN OF ALL CONTAINERS YOU HAVE BEEN BILLED FOR AS CONTAINERS AND WHICH YOU HAVE PAID FOR, PROVIDED THEY ARE RETURNED IN GOOD CONDITION ON OR BEFORE FEBRUARY 28, 1945. AFTER THAT DATE, NO CREDIT WILL BE ALLOWED FOR THE RETURN OF CONTAINERS.

THE COOPERATIVE EFFORT OF ALL CONCERNED WILL DETERMINE THE EFFECTIVENESS OF OUR POLICY AND OF OUR ABILITY TO CONTINUE IT.

GENERAL CABLE CORPORATION....

C O R P O R A T I O N

Steam

* This is the 9th of a series of informative messages concerning the meaning and significance of commonly used tests and terms employed to describe the characteristics of lubricating oils.

SCIENTIFICALLY ENGINEERED FOR EVERY INDUSTRIAL USE **TYCOL**

emulsion

TIDE WATER LUBRICANIA

DEFINITION: The A.S.T.M. Steam Emulsion Number (S. E. No.) is the number of seconds required for an oil to separate when emulsified with condensed steam and separated under definitely prescribed conditions.

TEST: A predetermined volume of the oil is placed in a test tube of prescribed size, which in turn is placed in a bath of water. A steam delivery tube is inserted into the oil extending to the bottom of the container. Steam is passed into the oil at such a rate as to maintain the temperature of the oil at 190-195°F. until the volume of the emulsion of oil and condensed steam is 40 ± 3 ml. The test tube containing the oil is next transferred to a separating bath maintained at a temperature of 200°F. to 203°F. The contents of the oil container is examined every 30 seconds. The time in seconds required for the separation of the 20 ml. of oil is reported as the A.S.T.M. Steam Emulsion Number.

SIGNIFICANCE: (S. E. Number) when applied to an unused oil indicates whether certain compounds (soaps, sulphonates and other emulsifying agents) or contaminants in an oil have been removed in the refining process. Changes in S. E. Number may occur during storage as well as in service. It may be stated that in general, the S. E. Number is not necessarily related to the oil's performance characteristics as a lubricant.

S. E. Number is sometimes included in the specification for certain oils, but there is no uniformity of opinion as to its practical value. This test as applied to used oils may be considered as of little significance.

Tycol lubricants are made from the most suitable materials. They are scientifically refined to meet stringent laboratory specifications and the recommended service requirement. It is this combination that assures the outstanding performance of Tycol Industrial Oils and Greases.

TIDE WATER ASSOCIATED OIL COMPANY

MAKERS OF THE FAMOUS VEEDOL MOTOR OIL • Eastern Division: 17 Battery Place, New York 4, N. Y.

Principal Branch Offices: **Boston, Philadelphia, Pittsburgh, Charlotte, N. C.**

INDUSTRIAL LUBRICANTS

COR-TEN *is on the way back!*

TO GIVE YOUR CARS MAXIMUM HAULING CAPACITY · TO REDUCE DEAD-WEIGHT TO A MINIMUM · TO INCREASE STAMINA AND PROLONG LIFE

IT has recently been indicated that during the second quarter of 1944, U·S·S Cor-Ten will again be available for third-quarter construction of mine cars.

This means that cars that are worn out and that should be replaced can be ordered now to give you all the economies of operation and maintenance that construction with Cor-Ten assures.

If you have been using Cor-Ten mine cars—built before Cor-Ten was limited to direct war production — you don't have to be told what this equipment will do.

More than 10,000 such cars now in service have proved that Cor-Ten construction will step-up output by increasing hauling capacity —will reduce operating costs by eliminating needless deadweight— will minimize maintenance because Cor-Ten gives greater stamina and high resistance to corrosion.

It is on its record of proved performance that Cor-Ten deserves your consideration. We will be glad to give you all the facts that will assist you in applying Cor-Ten most economically to your designs. If you are planning to purchase Cor-Ten cars in 1944, it is important that you file your requirements with the proper authorities — and send out your inquiries NOW.

U·S·S COR-TEN can be used to improve the efficiency of any type of mine car

1. U·S·S Cor-Ten is strong. It has a minimum yield point more than 50% higher than structural open hearth steel.

2. Cor-Ten has unusually high resistance to atmospheric corrosion—4 to 6 times that of plain steel—2 to 3 times that of copper steel. That's important in coal mine equipment.

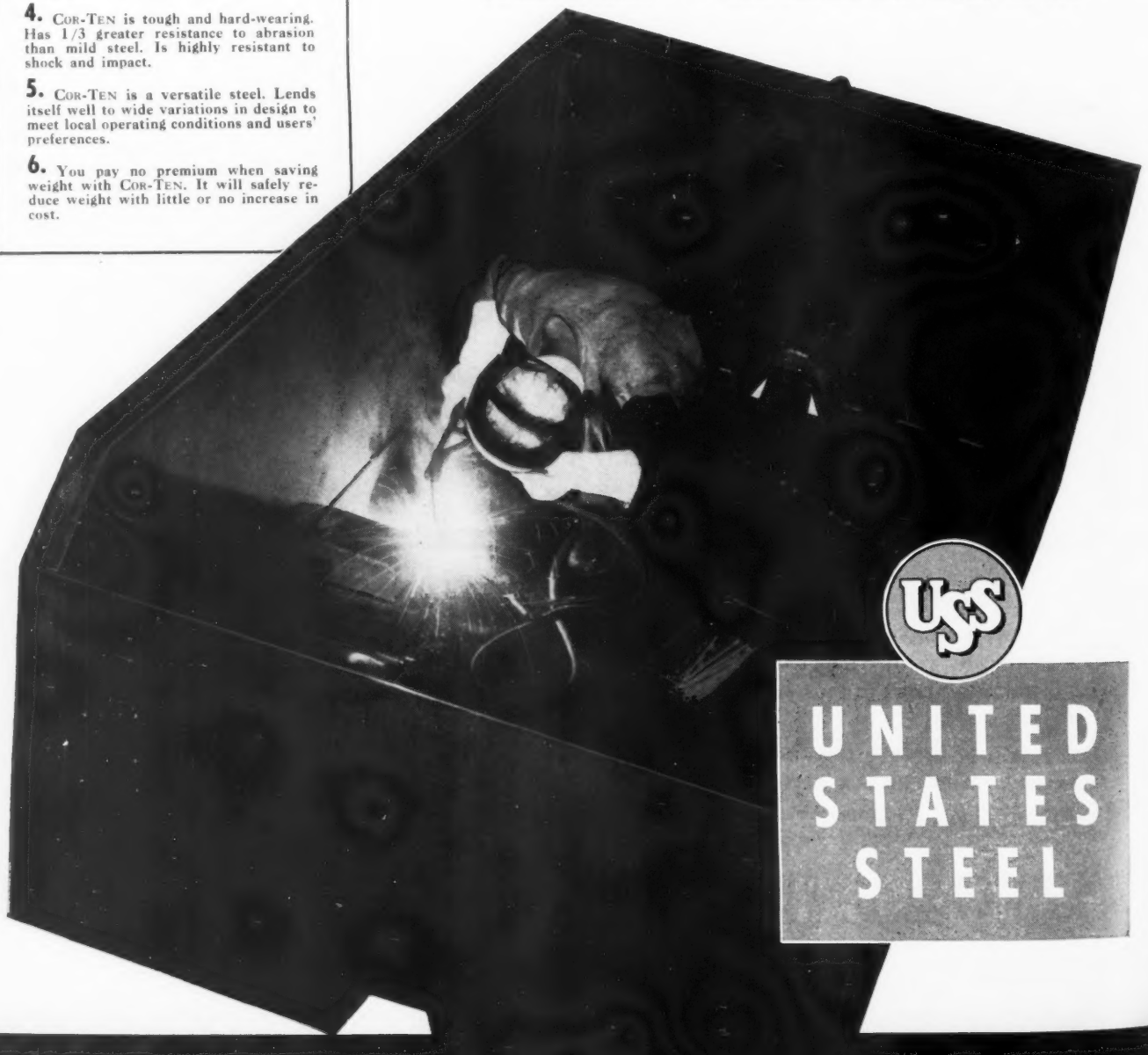
3. Cor-Ten is easy to handle—is readily fabricated by usual shop methods and equipment.

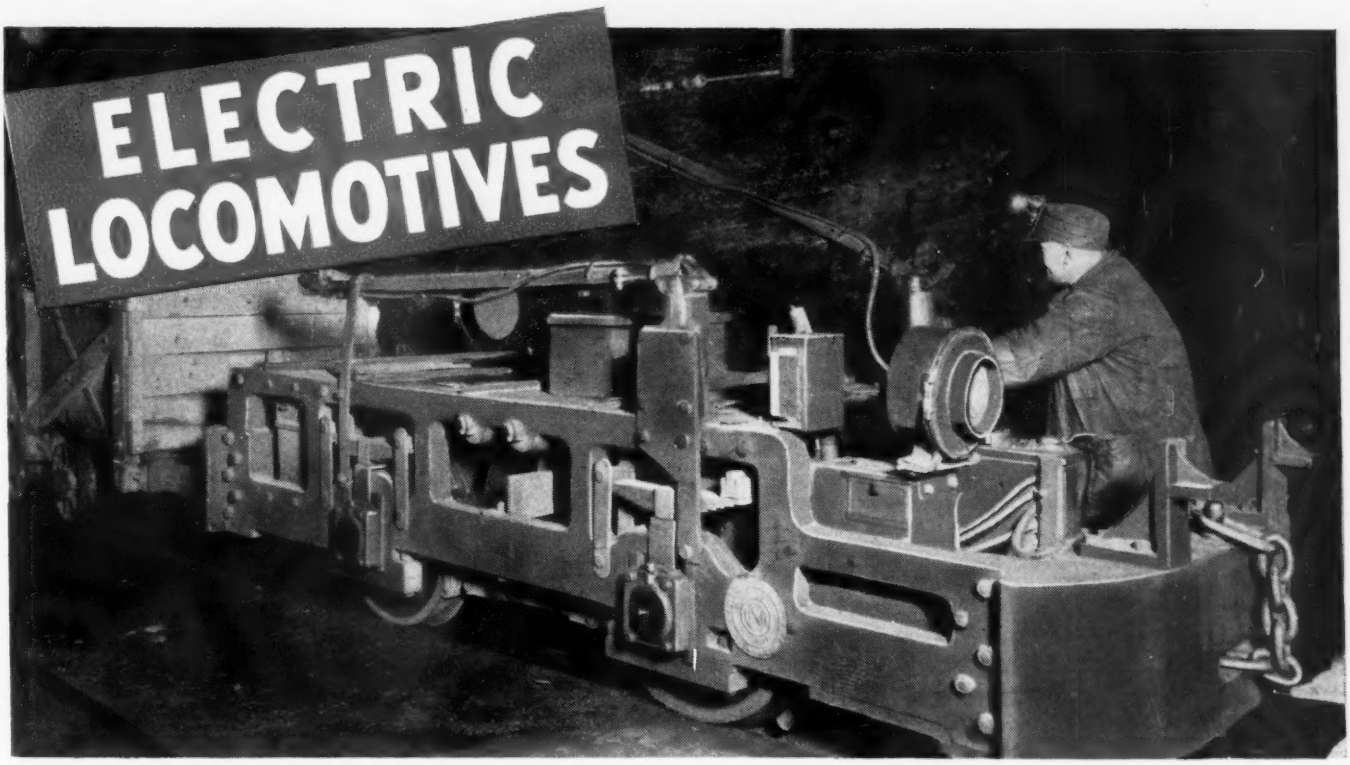
4. Cor-Ten is tough and hard-wearing. Has 1/3 greater resistance to abrasion than mild steel. Is highly resistant to shock and impact.

5. Cor-Ten is a versatile steel. Lends itself well to wide variations in design to meet local operating conditions and users' preferences.

6. You pay no premium when saving weight with Cor-Ten. It will safely reduce weight with little or no increase in cost.

AMERICAN STEEL & WIRE COMPANY, *Cleveland, Chicago and New York* · CARNEGIE-ILLINOIS STEEL CORPORATION, *Pittsburgh and Chicago* · COLUMBIA STEEL COMPANY, *San Francisco* · NATIONAL TUBE COMPANY, *Pittsburgh* · TENNESSEE COAL, IRON & RAILROAD COMPANY, *Birmingham* · United States Steel Supply Company, Chicago, *Warehouse Distributors* · United States Steel Export Company, New York





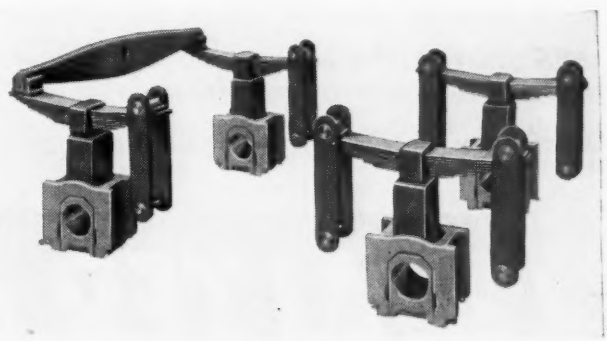
. . . for ANY Underground Requirement

FOR NEARLY SEVENTY YEARS the Vulcan Iron Works has been a leading manufacturer of industrial locomotives — taking full advantage at all times of every proved advance in design, materials, motive power and accessory equipment.

FOR MORE THAN TWENTY YEARS we have been manufacturing all types of electric mine locomotives for both underground and surface haulage.

TODAY, all of this accumulated engineering experience is available—under a vigorous new management—to locomotive users who realize that an extra margin of strength and endurance—greater adaptability to specific operating requirements—soon save far more than their moderate additional first cost.

Write us regarding any present or prospective requirement for Trolley, Cable-Reel, Storage-Battery, or Combination locomotives from 6 to 30 tons in weight. Our experienced engineering executives welcome opportunities to extend helpful suggestions, without charge or obligation of any kind.



THREE-POINT SUSPENSION

is a distinctive Vulcan feature which

(1) Keeps the locomotive on the track.

(2) Assures more uniform and effective draw-bar pull.

(3) Makes the locomotive ride easier.

(4) Reduces maintenance expense.

(5) Reduces wear on track switches and frogs.

VULCAN IRON WORKS

Main Office and Works WILKES-BARRE, PA., New York Office 50 Church St.

Heavy-Duty Electric Hoists
Self-Contained Hoists
Scraper Hoists
Car-Spotting Hoists
Room Hoists

Shaking-Chute Conveyors
Chain Conveyors
Cast-Steel Sheaves and Gears
Cages, Skips and Gunboats
Coal-Preparation Equipment

Steam Locomotives
Diesel Locomotives
geared and electric drive
Gasoline Locomotives
geared and electric drive

Load-Carrying Larries
Rotary Kilns, Coolers and Dryers
Crushing Rolls and Pulverizers
Briquetting Machines
Ball, Rod and Tube Mills

DON'T LET THE WEATHER "RUN" YOUR MINE!

The weather is not boss where Walter Tractor Trucks work. It can't rob those strip mines of valuable production time. Because —as long as shovels can dig, these giant trucks will haul. When trucks with conventional two- and four-wheel drives are stopped by soggy ground, steep grades and slippery coal beds, Walter Tractor Trucks keep the coal moving.

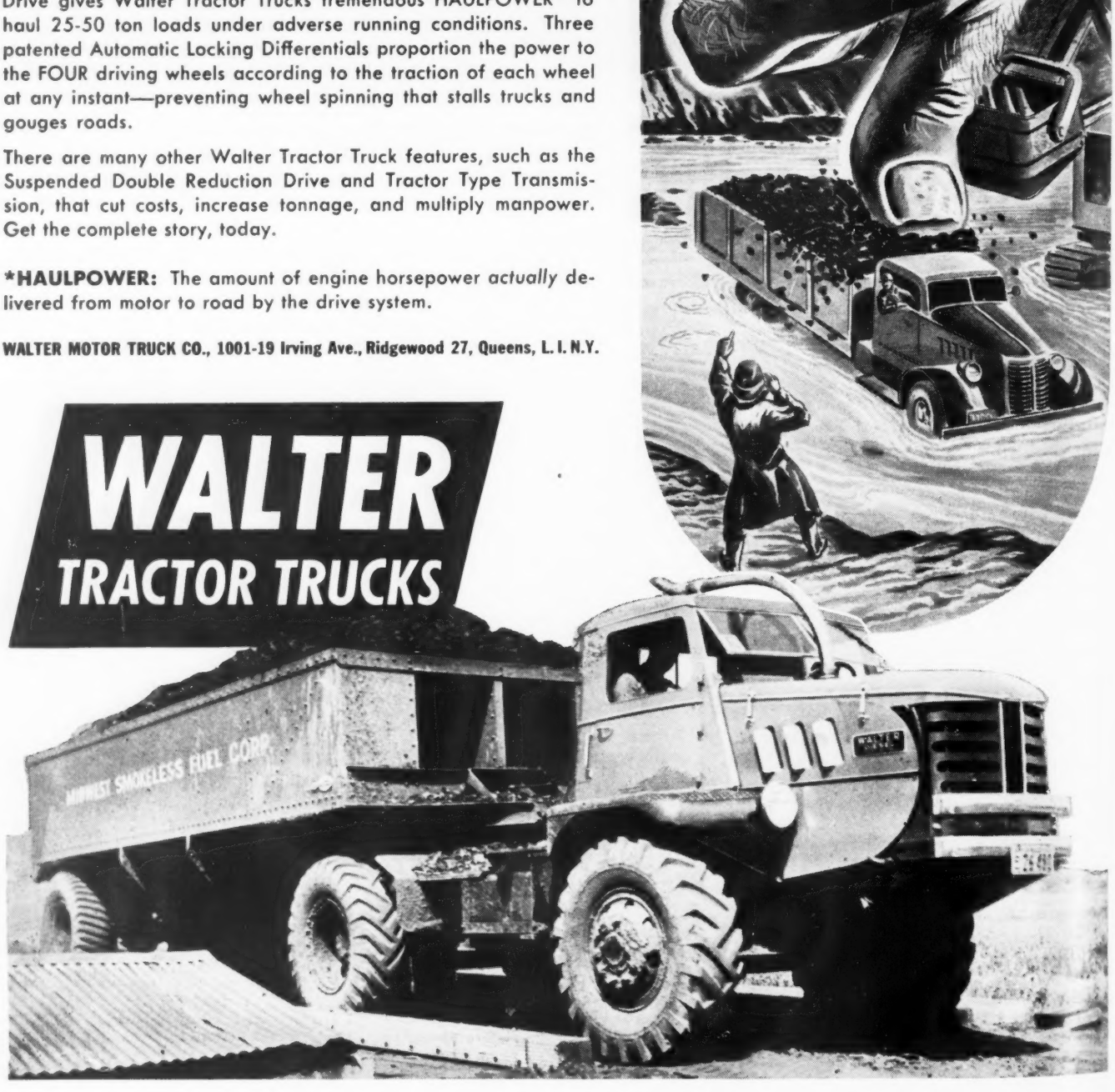
The great traction provided by the exclusive Four Point Positive Drive gives Walter Tractor Trucks tremendous HAULPOWER* to haul 25-50 ton loads under adverse running conditions. Three patented Automatic Locking Differentials proportion the power to the FOUR driving wheels according to the traction of each wheel at any instant—preventing wheel spinning that stalls trucks and gouges roads.

There are many other Walter Tractor Truck features, such as the Suspended Double Reduction Drive and Tractor Type Transmission, that cut costs, increase tonnage, and multiply manpower. Get the complete story, today.

***HAULPOWER:** The amount of engine horsepower *actually* delivered from motor to road by the drive system.

WALTER MOTOR TRUCK CO., 1001-19 Irving Ave., Ridgewood 27, Queens, L. I. N.Y.

WALTER TRACTOR TRUCKS



A GOOD MAN TO KNOW

— when you're buying synthetic rubber industrial products

Now with the mandatory conversion of industrial rubber products to synthetics, you need expert counsel more than ever in selecting the correct grades and constructions for your particular service.

That is why more and more operating men are guided by the recommendations of the G.T.M. — Goodyear Technical Man. An expert in industrial rubber, he is backed by Goodyear's twenty years' experience in developing synthetics and by the authority of the world's finest rubber research laboratory.

Long before the war, Goodyear was building many industrial products from synthetic rubber, based on knowledge that goes back to the granting of Goodyear's first synthetic patents in 1927.

As a result, the G.T.M. today is able to specify synthetic rubber products of standout quality. Some, especially for service where exposure to oil, gasoline or solvents is involved, set new performance standards.

Others, like the new Goodyear Style SS Conveyor Belt for abrasive conditions, are comparable to the best prewar quality. And still others, like our new Resoweld tank lining, perform tasks never handled satisfactorily by natural rubber.

Yes, it will pay you to consult the G.T.M. — if you want industrial rubber products that will maintain your speeded-up production schedules. To bring him to your office, phone the nearest Goodyear Industrial Rubber Goods Distributor — or write Goodyear, Akron 16, Ohio or Los Angeles 54, California.

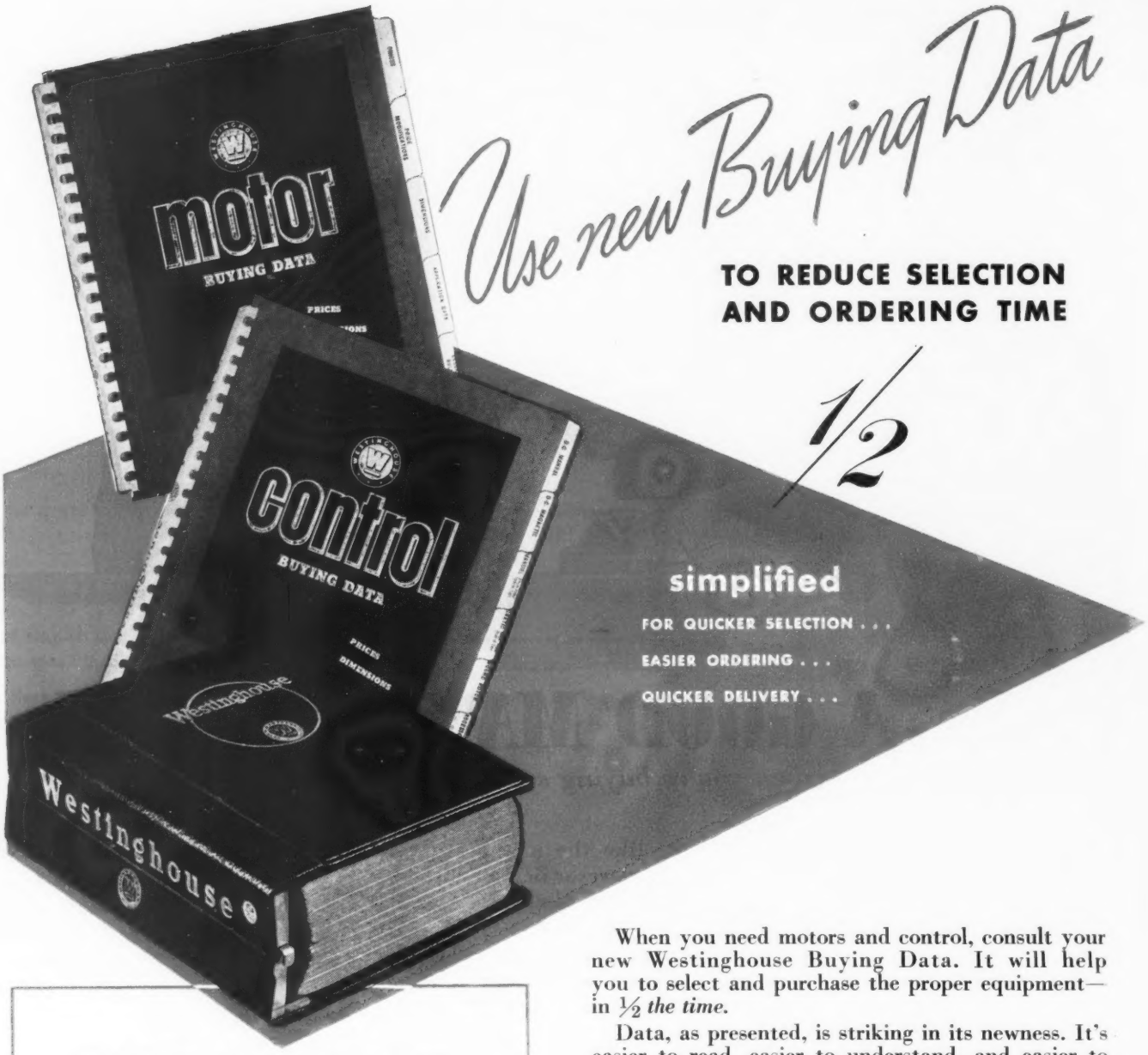
Resoweld—T.M. The Goodyear Tire & Rubber Company

GOODYEAR INDUSTRIAL RUBBER PRODUCTS
are tested and proved in the
WORLD'S FINEST RUBBER RESEARCH LABORATORY

The new Goodyear Research Laboratory, where 20 years' experience in synthetics and 46 years' skill in rubber engineering combine to produce better industrial rubber products.

GOODYEAR
THE GREATEST NAME IN RUBBER

Let's all Back the Attack with War Bonds



Use new Buying Data

TO REDUCE SELECTION AND ORDERING TIME

1/2

simplified

FOR QUICKER SELECTION . . .

EASIER ORDERING . . .

QUICKER DELIVERY . . .

When you need motors and control, consult your new Westinghouse Buying Data. It will help you to select and purchase the proper equipment—in ½ *the time.*

Data, as presented, is striking in its newness. It's easier to read, easier to understand, and easier to use than any offered previously by any manufacturer.

To fit widely varying requirements, this radically new Buying Data is available in two forms:

Motor and Control Loose-Leaf Book. This is for the use of large-scale purchasers and is "tailored" to meet the needs of the individual buyer. Pricing data is always kept up to date by the issuance of new price supplements.

Bound books are suitable for use of the majority of motor and control buyers. They contain prices (correct at time of issue and satisfactory for estimating purposes throughout the books' life), dimensions, application data and descriptions. Books include:

"Motor Buying Data" covering popular types and ratings of motors (up to 100 hp), Gearmotors and M-G sets.

"Control Buying Data" listing a wide variety of controllers and accessories for direct current, single-phase, squirrel-cage, wound rotor motors.

J-90499

HERE'S HOW TO GET THIS NEW BUYING DATA

If you are a buyer of Motors and Control, chances are you have already received this new data by mail.

However, if you have not received your copy, write, wire or phone your nearest Westinghouse district office (requests will be filled through district offices only—no mailings from Westinghouse Headquarters at East Pittsburgh). Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

Westinghouse MOTORS AND CONTROL

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

RED CROSS WAR FUND

Dig, Brother, DIG!
And we don't mean coal this time!

★

They say that charity begins at home

★

This war is awfully close to home these days

★

All of us have relatives and friends in uniform

★

Any moment, one of those close to us may be the one to need the helping hand of the

AMERICAN RED CROSS

★

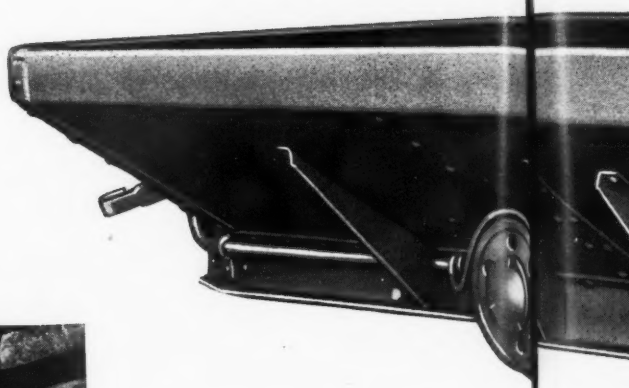
Your RED CROSS is at his side

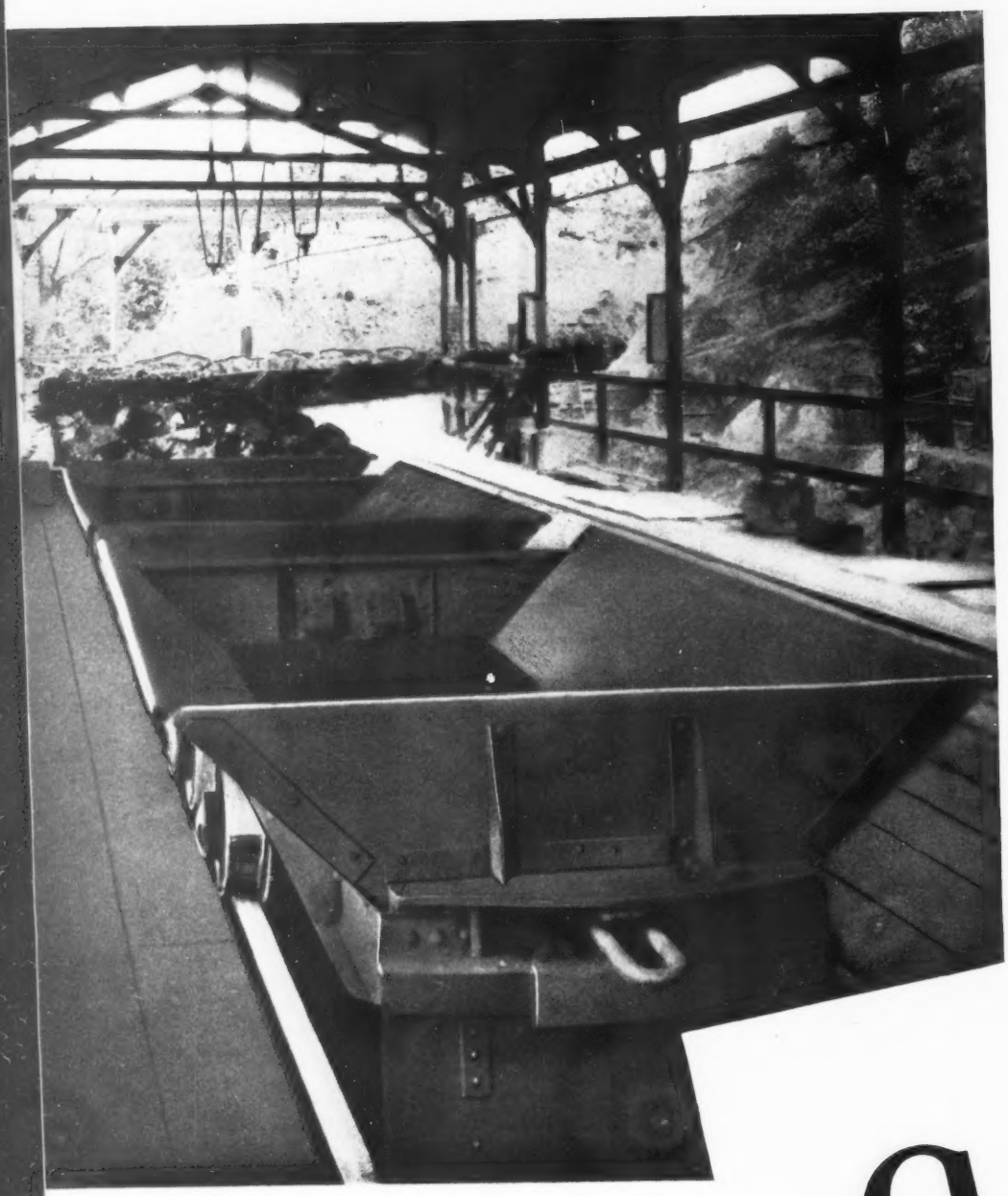
KEEP IT THERE . . . GIVE NOW!

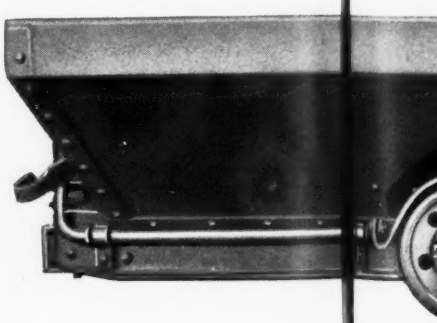
This advertisement contributed by the ALLEN & GARCIA COMPANY

Automatic DROP B

The car for production at low cost



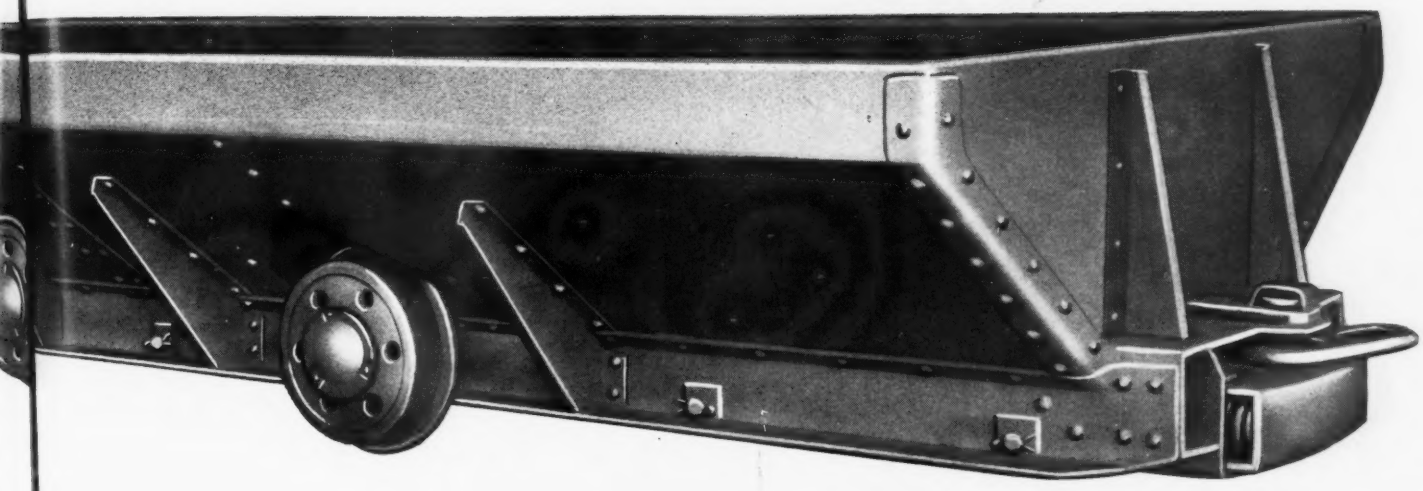


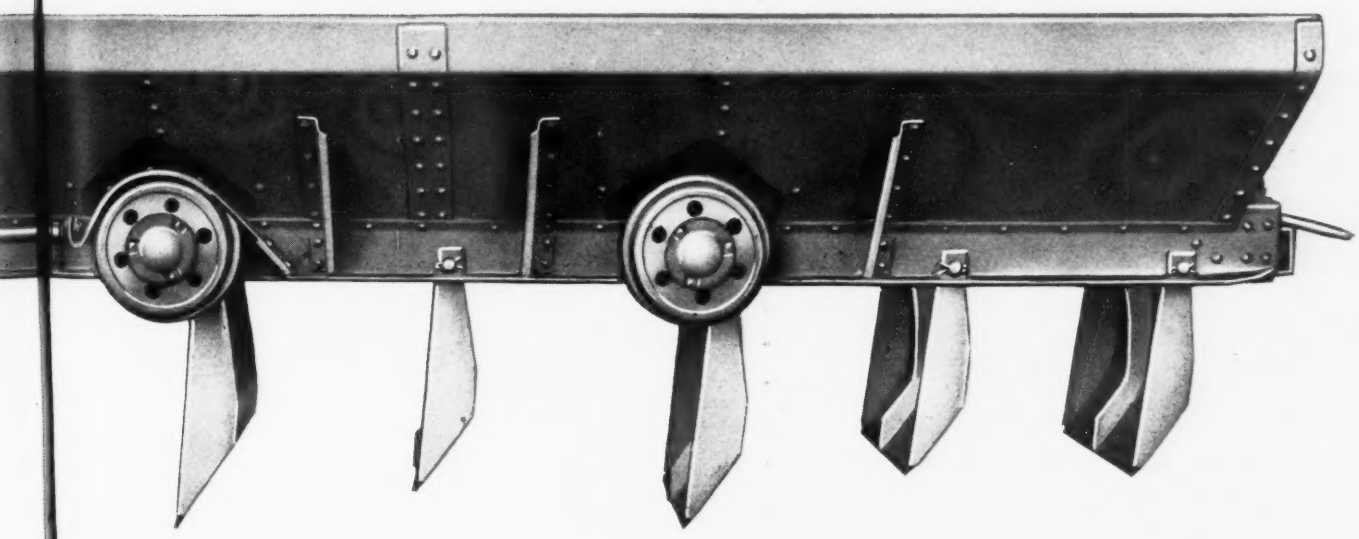


a.c.f.

AMERICAN

BOTTOM MINE CAR



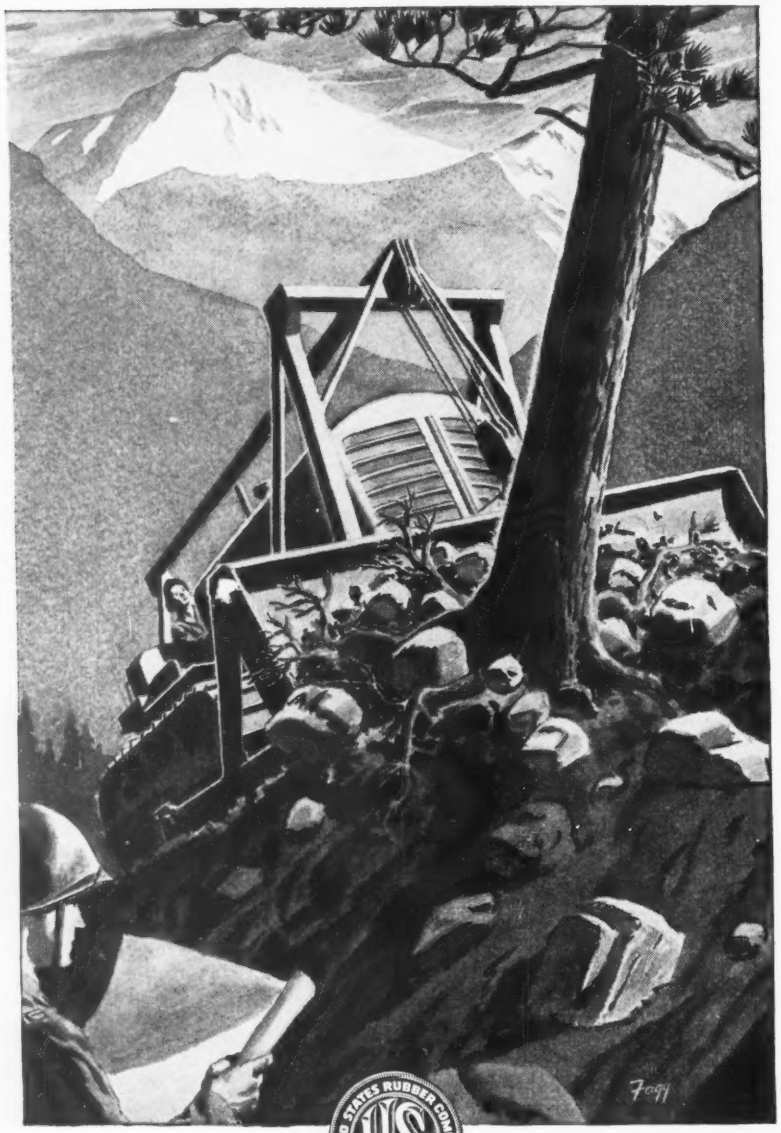


If your production costs are not entirely satisfactory, let us show you our drop bottom car in operation. The great amount of coal being brought out and dumped will please you. You will see the great tonnage moving in trains without interruption. Trains are unloaded smoothly, coal being dumped through doors in bottom of cars. The unloading, and the closing of doors, is all automatic – without stopping the train, which then makes a return trip into the mine for another load. Large tonnage of coal is handled with few cars. The car shown above is equipped with six drop bottom doors, but cars of smaller capacity have three doors.

We will be pleased to arrange to have you see drop bottom cars in operation. Possibly in this way we can be of service to you.

N CAR AND FOUNDRY COMPANY

NEW YORK • ST. LOUIS • CHICAGO • PHILADELPHIA • BERWICK, PA. • PITTSBURGH • CLEVELAND • HUNTINGTON, W. VA.



Mechanical Giants
—with muscles of oil

Seabees and Army Engineers are putting bulldozers to work under conditions and on jobs nobody ever thought a machine could handle before the war. They whack out roads in dense Pacific jungles. Level landslides in Italy. Build landing fields on barren Aleutian Islands. Even wipe out Jap pillboxes with these mechanical giants.

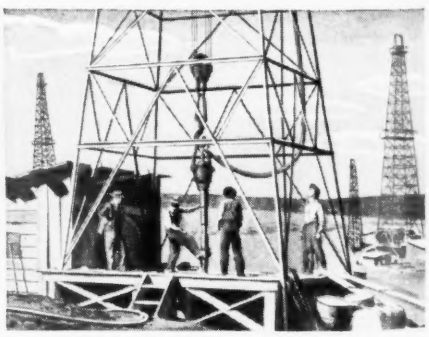
Earthmoving parts of bulldozers... like the working parts of so many modern machines ...are operated hydraulically. They get their power through relatively slender hose that must be scientifically designed and built to withstand tremendous pressures, extreme changes of temperatures and to be able to flex without excess strain.

Scientific design is equally true of air hose, drilling hose, oil and gas hose...scores of different types of hose manufactured by United States Rubber Company. Many of them...like the hydraulic hose in bulldozers . . . are being subjected to new and unexpected strains and punishment in their wartime jobs. United States Rubber Company scientists are putting all their skill and ingenuity into improving the stamina and quality of U. S. Rubber Hose. The knowledge they are gaining now will be put to good use in peacetime applications.

SERVING THROUGH SCIENCE

HOSE, specially engineered to handle extremely high pressures, furnishes the power for air-hammers and compressed air drills in mines and quarries the nation over.

"BOMBS AWAY"... and on target... mean that hydraulic machines have once again operated smoothly and efficiently. Bomb-bay doors and landing gear are only two of many places in fighting planes where hose is on the job.



DRILLING HOSE, suction and discharge hose help keep vital petroleum flowing to the Armed Forces and to industry. Here again, hose must be scientifically designed, specially made for a specific task.

Listen to the Philharmonic Symphony program over the CBS network Sunday afternoon, 3:00 to 4:30 E.W.T. Carl Van Doren and a guest star present an interlude of historical significance.

UNITED STATES RUBBER COMPANY

1230 SIXTH AVENUE • ROCKEFELLER CENTER • NEW YORK 20, N. Y.

SANDBLAST YOUR MINE CARS IN 3 HOURS LESS TIME ...PER CAR...WITH SCHRAMM AIR COMPRESSORS!

"Where it once took 7 to 8 hours to sandblast each mining car, now it takes only 4 to 5 hours—because we have a Schramm Compressor!" reports a mine electrician and mechanic.

Over the course of two years this has resulted in a saving of many man hours, and quickened production. A 3-hour saving is recorded also in metalizing cars with air supplied by Schramm, the mechanic reports. The compressor doing this special job is a #210 Diesel stationary.

Schramm compressors are lightweight and compact—versatile to the point of cleaning machinery—rock drilling and boulder breaking—furnishing air for truck tires—blowing dust from electric motors and radiators. They're completely water cooled—self oiling because of forced feed lubrication—easy to start by pushing a button.

You will find Schramm an indispensable piece of coal mining equipment. For other information on how Schramm fits into your coal mining picture, write today for catalog 42-S or see the Coal Mining Catalogs.

Red Letter **SCHRAMM** *Features*

100% WATER COOLED... No freezing in winter, no overheating in summer.

BUILT AS A UNIT... Compressor and engine are coupled together as a perfectly aligned, vibrationless unit.

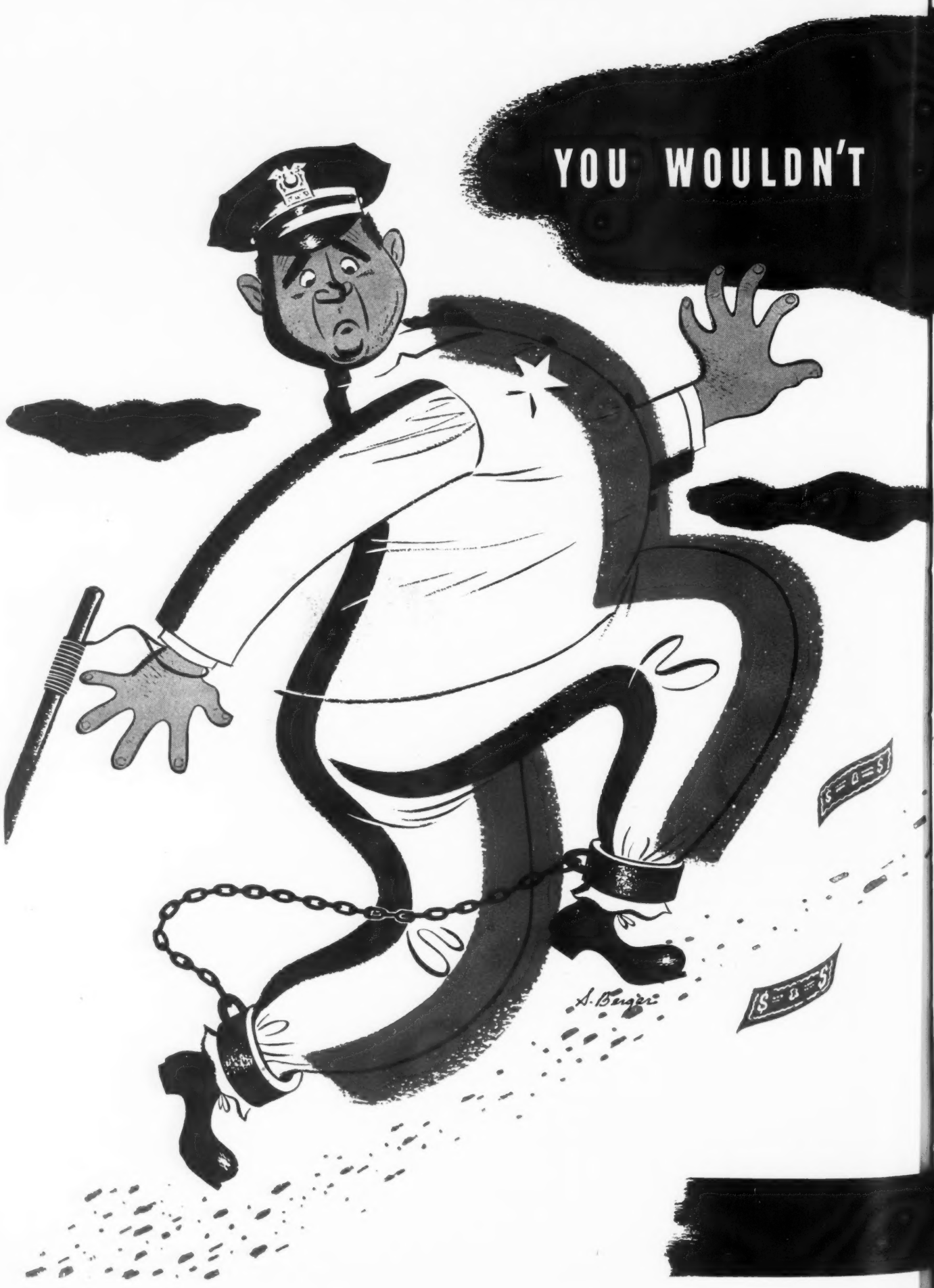
MECHANICAL INTAKE... Valves operate from cam in perfect timing with crankshaft and piston travel.

BUILT-IN ELECTRIC STARTING... No cranking, no injuries, and air in a minute. Just touching the button puts your men and tools to work at once.

LARGER DISCHARGE... Entire area of piston heads is devoted to one big discharge valve for each cylinder. Bigger area combined with lower lift adds to both efficiency and useful life.

★

SCHRAMM INC. THE COMPRESSOR PEOPLE WEST CHESTER PENNSYLVANIA


YOU WOULDN'T
A. Berger

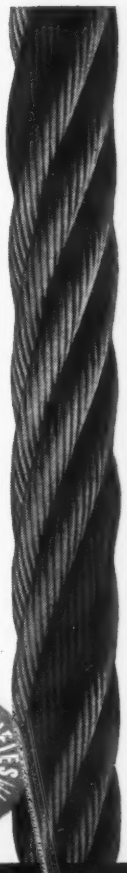
SHACKLE A *Policeman*

...LAY·SET PREFORMED IS AT EASE

Putting non-preformed wire rope on your machines is like putting shackles on a policeman. You shouldn't expect a wire rope that is twisted tightly and under constant tension, to operate well or long.

In Hazard LAY-SET Preformed every wire and strand is preshaped to the exact curve it assumes in the finished rope. That's why LAY-SET is at ease, relaxed, free to work and work willingly. Being free of torsional stress, Hazard LAY-SET Preformed lasts longer, gives you greater dollar value. Be sure your next rope is Hazard LAY-SET Preformed.

Ever since Pearl Harbor, and even before, Hazard LAY-SET Preformed has been saving time and money for the Government, the Armed Forces, and the taxpayer.

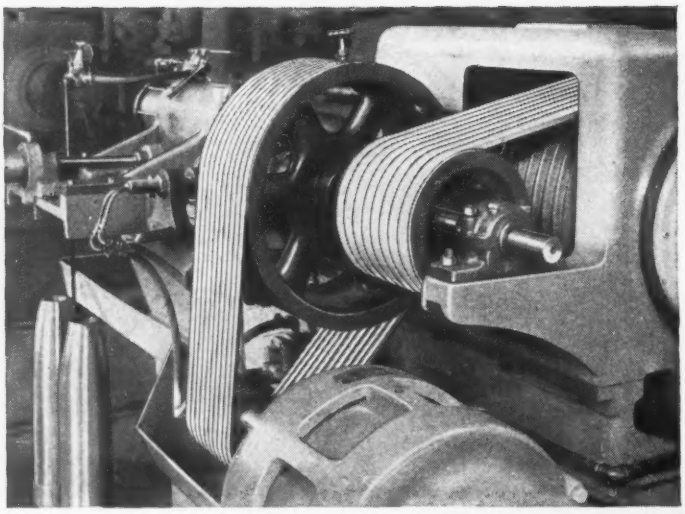


HAZARD WIRE ROPE DIVISION • Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Fort Worth, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, Tacoma, San Francisco

AMERICAN CHAIN & CABLE COMPANY, INC. • BRIDGEPORT • CONNECTICUT

GREEN SIGNIFIES SAFETY

HAZARD LAY·SET *Preformed* WIRE ROPE



*Used in Many Industries

On this machine which profiles the outside of high-explosive shells, Gates V-Belts of special synthetic rubber are used because of their proved ability to withstand bad oil conditions. By actual records, on hundreds of installations where oil or heat conditions are severe, Gates special synthetic V-Belts are wearing 2 times to 3 times as long as any natural rubber belts ever used!

Widely Used* for Over 6 Years

GATES Synthetic Rubber V-Belts

—Have Proved *Superior*

Even to Belts of *Natural* Rubber!

Gates began making V-Belts entirely of synthetic rubber more than 6 years ago. Each year since then, thousands upon thousands of Gates synthetic rubber V-Belts have been making outstanding service records in aircraft factories, in steel mills, in ordnance plants, in machine parts factories—in fact, in practically every type of industrial plant in the nation.

This long *head-start* in the fabrication of synthetic rubber V-Belts was no accident. It was started deliberately, in peacetime and not under pressure of necessity. The synthetic rubber selected by Gates is a very *special* synthetic rubber—not in any sense merely a "substitute" for rubber. In certain very important applications it is *greatly superior* to natural rubber.

For example;—one special synthetic rubber selected by Gates has the unusual characteristic of withstanding oil and heat much better than even natural rubber. Where heat and oil conditions are especially severe, Gates special synthetic V-Belts are outwearing any natural rubber V-Belts by as much as 230%.

Of the very greatest importance to V-Belt users today is Gates' unusually long experience and success in making V-Belts of synthetic rubber. This is especially important now because the time has come when Gates' superior knowledge of synthetic rubber can be put to work for you right in your own plant.

You have only to look in your telephone directory and call the Gates Field Engineer. He will put at your service the full benefits of Gates' knowledge and experience without the slightest obligation.

443

THE GATES RUBBER COMPANY

Engineering Offices and Stocks in All Large Industrial Centers

GATES VULCO ROPE DRIVES

CHICAGO, ILL. 549 West Washington
NEW YORK CITY 215-219 Fourth Avenue
ATLANTA, GA. 738 C & S National Bank Building
LOS ANGELES, CAL. 2240 East Washington Boulevard
DENVER, COLO. 999 South Broadway
DETROIT, MICH. 8663 Grand River Avenue
PORTLAND, ORE. 333 N. W. 5th Avenue
DALLAS, TEXAS 2213 Griffin Street
SAN FRANCISCO, CAL. 1090 Bryant Street

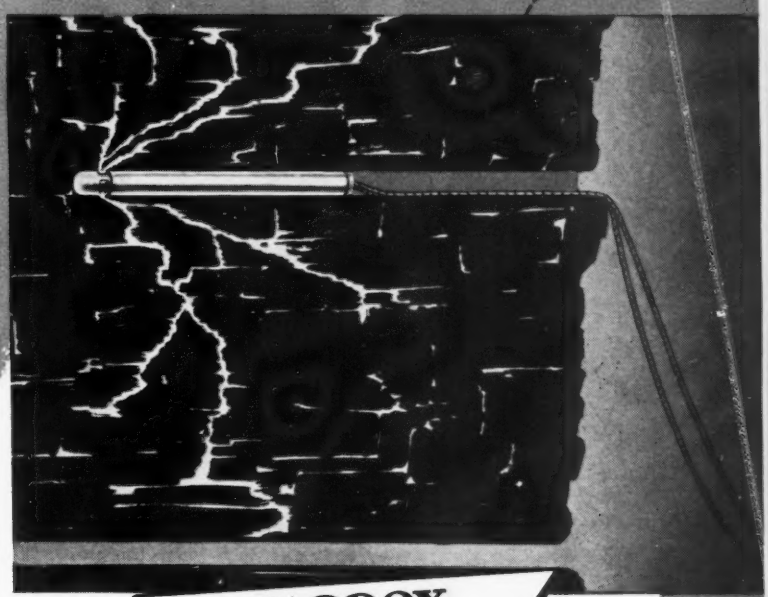
CARDOX

"THE NON-EXPLOSIVE MINING METHOD"

REDUCES ROOF and RIB FAILURES!

EXPLOSIVE

Explosives shoot down coal with a shattering blast that introduces shatter-cracks for a distance of 18′ to 20′ in every direction. This weakens the entire coal structure and frequently causes roof and rib failures either at the time of the explosion or later.



CARDOX

CARDOX dislodges coal with a slow heaving action that avoids causing shatter-cracks in the roof and ribs as well as in the working face.

• While not as highly publicized as the more spectacular mine accidents, roof and rib failures cause approximately 50% of the fatalities in underground coal mine operation.

Proof that the shock due to the detonation of explosives is often responsible for dangerous and costly roof and rib falls is disclosed whenever Cardox Engineers run "preparation tests." Long experience has shown that to get a true picture of the effect of CARDOX on coal structure, samples for screen analysis must be taken from 18′ to 20′ beyond the last fall produced by explosives. The first three cuts must be thrown away because the structure of the coal in the intervening area is so weakened by shatter-cracks that it is useless for test purposes.

Obviously the explosive force that weakens coal structure for a distance of 18′ to 20′ must have unfavorable effect on roof and ribs for a considerable distance — must be largely responsible for many roof and rib failures.

The CARDOX mining method reduces hazards from roof and rib failures because the effect of the CARDOX discharge is mild. It acts with a slow heaving, spreading and shearing action. There is no shattering detonation. There is little disturbance of the roof and rib structure. Accident hazards and timbering costs are reduced.

Let us demonstrate by a test in your own mine the value of CARDOX in reducing a major cause of accidents — *Roof* and *Rib* Failures.

Keep Your Dollars Fighting • • Buy War Bonds

CARDOX CORPORATION • BELL BUILDING • CHICAGO 1, ILLINOIS

You Can Satisfy
WE'RE BACKING UP
SOME FACTS ABOUT ANTHRACITE
ANTHRACITE INDUSTRIES, INC.
101 PARK AVENUE NEW YORK 17, N. Y.
IN THE SALES AREA
None of us will ever forget this winter. You've faced the toughest job of your career—our problems weren't simple. Yet together, in spite of last year's late spring, colder weather this season, governmental directives, delivery headaches all the way from the mines to customers' coal bins, Anthracite dealers have managed
to serve 6,000,000 regular customers
to take care of thousands of converted heating plants
to stretch hard coal to the new needs of Army camps, war housing, new users in their districts everywhere.
This page reviews some of the ways the Anthracite Industry has been backing you—helping you perform this magnificent job. From the beginning of the heating season, we have distributed more than two million of the famous Anthracite Conservation Folders with your assistance . . . published smashing conservation advertisements throughout the sales area and furnished 25,000 reproductions for display . . . kept up a steady stream of news and publicity stories. Right now we're explaining the Anthracite situation to consumers, telling them how to help, keeping up the coal-saving campaign . . . in weekly advertisements appearing in the sales area cities . . . in daily news stories.
ANTHRACITE INDUSTRIES, INC.
101 PARK AVENUE, NEW YORK 17, N. Y.

HOME FIRE BU

WAKE UP YOUR HE

THE GREAT JOB YOU'RE DOING

IN THE PRODUCING REGION

We are explaining to the miners that, in addition to taking care of the needs of six million regular customers, Anthracite has had to take care of thousands of other homes that would otherwise go cold. War demands have seriously taxed even the increased tonnage of the war years. As a consequence, even greater production is needed.

Five times a week, Anthracite Industries is on the air from seven stations in the Producing Region. Production-aiding talks by Region civic leaders feature these programs. Tied directly to the broadcasts, weekly newspaper advertisements bring home the need for increased output.

PEOPLE ARE SORE AT
Did you hear this man on the radio the other night? He said PEOPLE ARE DESPERATE!
ANTHRACITE INDUSTRIES, INC.
916 Bromo Building, Wilkes-Barre

ANTHRACITE INDUSTRIES, INC.

101 PARK AVENUE, NEW YORK 17, N. Y.

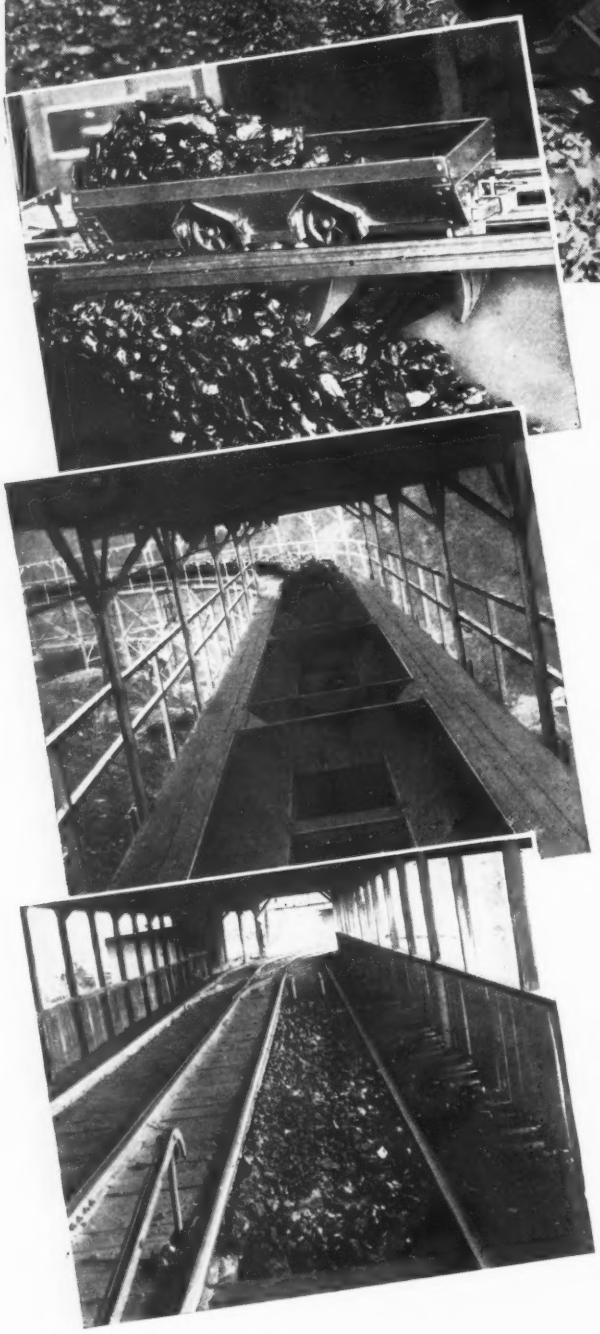
More Warm

ACCORDING to the experts, the average coal burning home often loses more than 10 per cent of its heat through improper firing methods used by persons taking care of the furnace. Or, to put it another way, the use of proper firing methods will house comfortably warm on less coal.

Fuel Stretching Up to You This Winter

(This is the fourth and last of a series of articles on how to get the most out of your rationed fuel this winter.)

The Sweetest Sight In Mining!



★ Some day the sweetest sight to your eyes will be the constant even flow of S-D "Automatic" trains of coal coming out of your mine—the answer to top tonnage.

Now, don't just take a glance, but study carefully, the illustrations in this ad from top to bottom. Not particularly the cars but their action. First, let's look at top illustration. Now, bear in mind that this string of S-D "Automatic" cars never stops rolling after it leaves the mine until the cars return empty; and they'll pass another trip on their return to the mine.

Next, you see how S-D 1-2-3 "Automatics" lay the coal down gently, while in motion, one door at a time, without breaking the coal. This action is taking place in the third illustration—a full train in motion, discharging its coal—20 car loads a minute. The fourth illustration shows how your bin can be filled level full (possible only with "Automatics") when, for any reason, screening or cleaning plant is down.

Here you have the simple story of the most sensible guarantee for top production, minimum man power, at the least possible cost per ton. Reduced costs are certain So certain, that we are willing to rent S-D "Automatics" to you on a basis so liberal that your cash savings will more than pay the rentals. After these savings have been proved, you may purchase the cars if you wish. You can't lose. Why hesitate? Write for full details now.

Sanford-Day Iron Works

KNOXVILLE • TENNESSEE

1—We do not extend terms beyond what good business dictates.

2—We are manufacturers and not bankers.

3—We do not promise to buy your product or sell your product for you.

4—We sell a dollar's worth of explosives for an American dollar.

5—We have one permissible powder that will fit your coal seam perfectly included in the *ten* permissible powders that we manufacture.

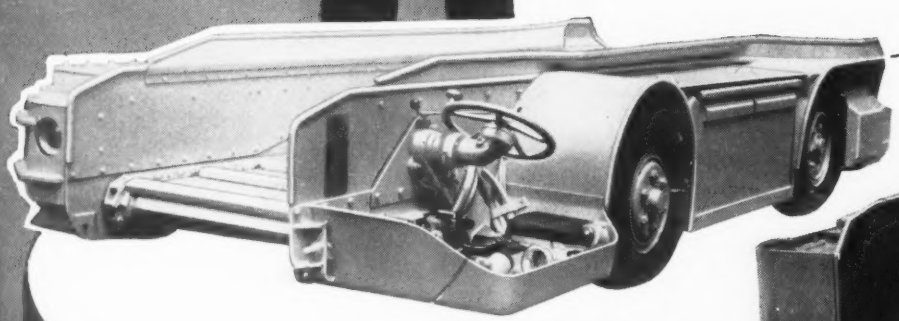
Not living on our reputation but building it.

NATIONAL POWDER COMPANY

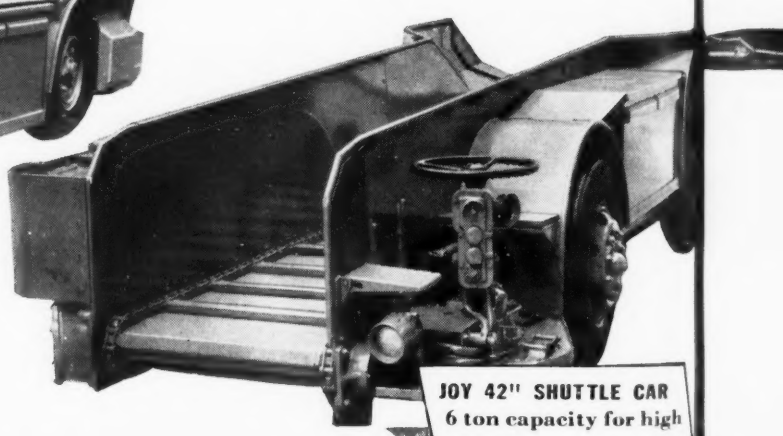
ELDRED (McKean County) PENNA.

Manufacturers of High Explosives for all Industrial Purposes

FIRST AID TO MODERNIZATION



JOY 32" SHUTTLE CAR
3½ ton capacity for low seam operations.



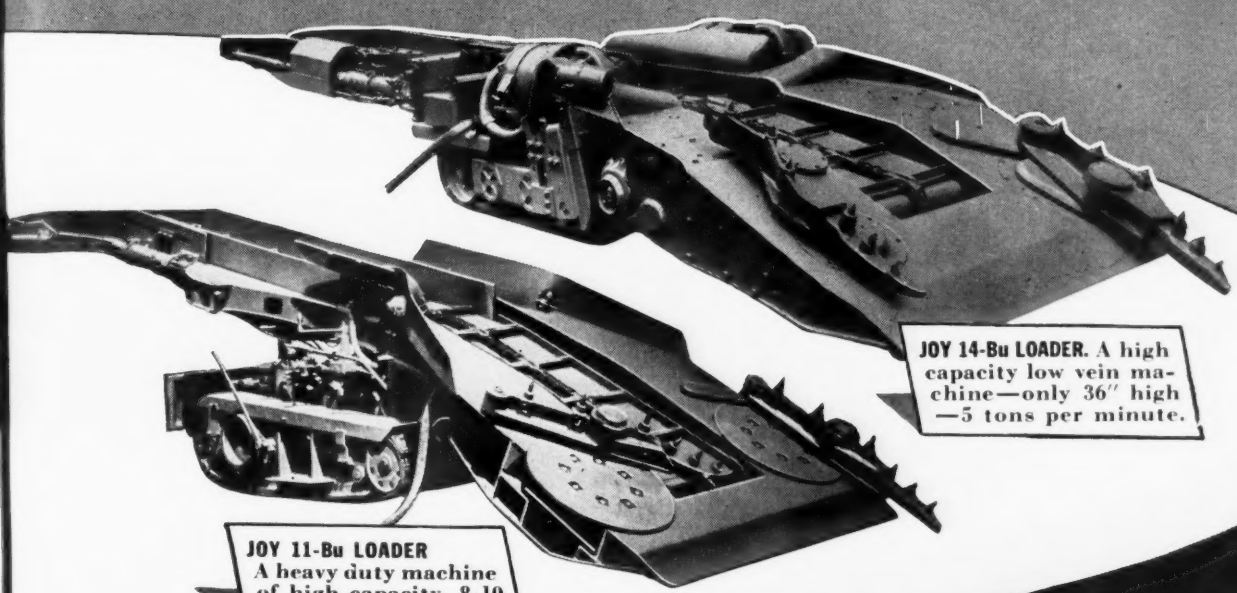
JOY 42" SHUTTLE CAR
6 ton capacity for high seams.

Joy Equipment is engineered and designed by men who are thoroughly familiar with coal mining in all of its various phases. We will be glad to check your conditions . . . study your problems and advise you factually to the best of our ability.

Consult a Joy Engineer

JOY
MECHANIZED EQUIPMENT

SPEEDS OUTPUT
LOWERS COST

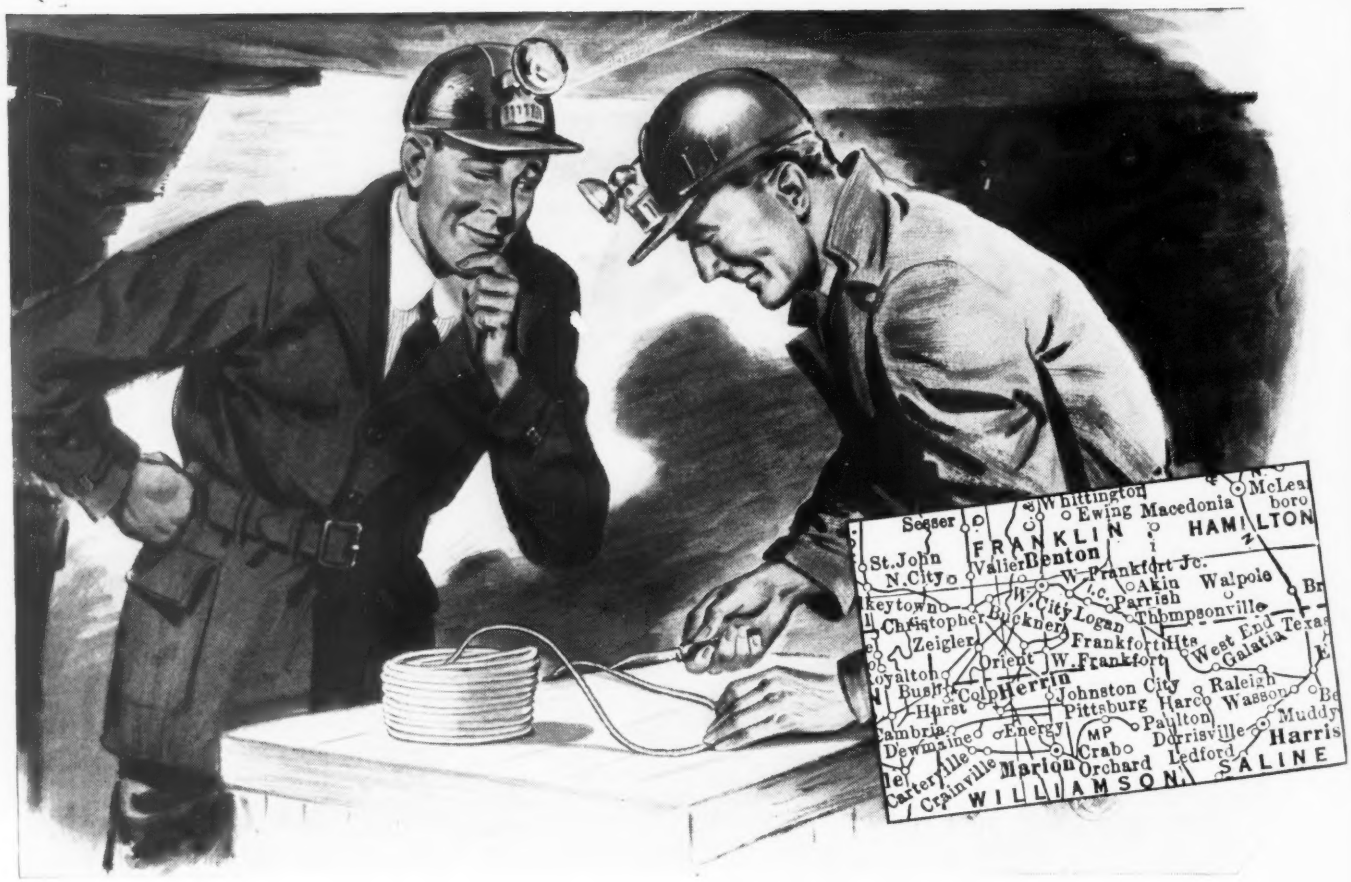


JOY 14-Bu LOADER. A high capacity low vein machine—only 36″ high —5 tons per minute.

JOY 11-Bu LOADER
A heavy duty machine of high capacity, 8-10 tons per minute.

JOY

MANUFACTURING CO.,
FRANKLIN, PA.



We swapped knives and solved a mystery

Hobson pulled out a jackknife and dug into his battle-scarred briar. This reminded me that even a company guest is not permitted to smoke in a coal mine, so I grabbed my penknife and emptied my pipe also.

A trivial incident, perhaps, but the fact that Hobson and I were both pipe smokers has a lot to do with this story.

There was no end spit . . .

My job in those days was to discover the causes of blasting trouble. On this particular morning we were going down 300 feet to try to figure out why the miners had been finding unexploded powder in the muck. Some of it had caps attached — and that's bad!

Underground they were driving a rock drift, and had 19 holes in the face, ready to load. The helper had brought up the powder, and Hobson started in immediately to make up his primers.

Producing his jackknife, he cut the fuse square across, measured off a good length and cut it again. He'd cut about three lengths when I recalled his pipe-cleaning, and asked to see his knife. Sure enough, the blade was black, caked with pipe "dottle" and asphaltum — and not too sharp!

With my knife I cut a foot off the coil of fuse and lighted it with my lamp. "Now watch!" I said, as I laid it on the floor.

We all crouched down, and presently the fuse had burned through, but the asphaltum had blocked off the end spit.

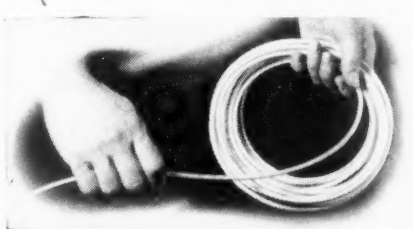
"That may be the cause of your misfires," I remarked. "The knife blade is caked and dirty and not sharp enough. Instead of cutting clean through the wrapping and asphaltum, it pinches the fuse and drags asphaltum across the powder train. This may have prevented an end spit so that the cap didn't explode." "Here —," and I handed him my knife, "try cutting the fuse with this."

Well, he trimmed off the pieces with my knife and completed the round, going through all the motions according to the book: clean, square-cut fuse; tightly crimped in the cap; the cap buried in the center of the cartridge; and tied tightly with tarred twine. When all was loaded, tamped and trimmed, he lighted the round and we went back and sat down along the entry and waited. Every hole fired.

"You use your knife to empty your pipe," said Hobson, as he handed it back to me. "How come you keep it so clean?"

"I use the other blade," I replied.

THE ENSIGN-BICKFORD COMPANY
Simsbury, Connecticut



ENSIGN-BICKFORD
Safety Fuse
Since 1836
Also Makers of Primacord-Bickford Detonating Fuse

Coal Age

DEVOTED TO THE OPERATING, TECHNICAL AND BUSINESS PROBLEMS OF THE COAL-MINING INDUSTRY

March, 1944

Key to Progress

COAL definitely is entering a new age—an age of increased opportunity. True, it has a few hard fights ahead, as pointed out in the survey of the future—"The Coming Coal Era," starting on p. 58 of this issue. But in no case are these fights hopeless. The long period of heavy sacrifices of tonnage to promotion of efficiency in consumption is nearing its end in many fields, although not all, while new outlets promise substantial additional production.

More research, cost reduction and higher quality will hasten the new era. But they are not enough. Public opinion still is a vital factor in coal's progress. At the moment, in addition to other misinformation and prejudice, coal must cope with the repercussions of shortages and distribution regulations growing out of stoppages beyond its control. Unfair and illogical though it is, the consumer, in the absence of accurate data, is inclined to hold responsible the source of his fuel—the producer. It behooves the industry, therefore, to make sure the public understands how its difficulties came about and what the producer is doing to alleviate them.

Anthracite has been worst hit and consequently is faced with the biggest task in winning and holding public regard. It is tackling the job with courage and a well-thought-out program. Bituminous is in a relatively better position but it also has a job to do. Its industry-wide and local public-relations organizations are doing yeoman work, but more money and cooperation would make them even more effective. The keys to the future are not alone cost reduction, quality improvement and research. Strong public-relations programs with 100-percent industry support are equally vital as a sound foundation for progress.

Good Trading

SPENDING $125 to get back $1,200 sounds like a deal anyone would accept without a second thought. But it's not always so. Many opportunities as good or better often go begging in coal mining. And in many cases, the only investment necessary is a little brain sweat. Making it possible for water to run downhill or air to travel one way frequently is just a matter of planning. When it comes to such things as efficiency in face work, the possibilities in thought and judicious outlays of money are even more attractive—often 50¢ a ton or better.

Cost will be one of coal's major weapons in clinching its position as the leading source of power and energy in the future. Assuring low cost requires a thoroughgoing and realistic appraisal of the value of existing practices at each and every mining property. The opportunities for saving with modern equipment and methods thus revealed will go far toward fitting the industry to discharge its future responsibilities to its existing and new customers.

Oil Crossroads

THE UNITED STATES is now at the crossroads in oil. It can take the way of dependence on foreign supplies with the hope that they will be available for defense purposes in time of need if not for ordinary civilian activities. Or it can guarantee an adequate supply of liquid fuels for all purposes in the future by perfecting processes for making them from another source of hydrocarbons. Coal is the logical source.

What conditions should exist to guarantee a flow of oil from abroad? First, there is the oil itself. There are large supplies in the Middle and Far East. But can the United States be assured of free and unlimited access to the territories of other powers in perpetuity? Then there is transportation. Can the United States also depend on free and unhampered movement of oil to its shores from now on? Both conditions must be guaranteed before the nation can say that its oil problem is solved. Development of foreign sources of oil may be one step that should be taken, but in view of but one recent experience—in rubber—relying on them completely would seem, to put it mildly, foolhardy.

The answer is to keep the United States independent in oil. In view of the decline in discoveries within our borders, the way to do it is to prepare to make liquid fuels from other, plentiful materials. Coal, as stated, is the logical one. Congressional bills authorizing construction of commercial-scale plants are a move in the right direction. But coal men can—and should—help by putting pressure behind the movement and expanding their own work. The latter is as important as the former. The more time and money devoted to making practicable the production of liquid fuels from coal, the sooner the nation—and the coal industry—will benefit.

The Coming Coal Era

Where is coal headed after the war? Up on practically every front according to all available signs. Possible new uses, such as gasoline from coal and powdered fuel for open-hearth furnaces, open up prospects of big new tonnages, while the full possibilities in existing fields are yet to be explored. But there is work still to be done—plenty of work. Cashing in on prospects requires the utmost pressure on research into new uses, higher efficiency in existing uses and quality coal.

COAL is the fuel of the future. Even its competitors admit that. The important question, however, is: When is the future? Is it tomorrow? Is it after the war? Is it 1960? 1975? When will coal—the nation's No. 1 source of heat and energy—benefit from the undoubted opportunities ahead and what can it do to hasten the day?

We all know that today's job for coal is to get out every possible ton to help bring victory quicker. But what of the future after victory has been achieved? What are coal's competitive chances in the postwar world?

The answers to all these questions depend on two factors: the national economic picture and how much the industry itself is willing to spend in foresight and money to capture the markets that unquestionably will exist. The first of these factors can be forecast with reasonable accuracy and with almost perfect unanimity. The second is more indefinite, but it too is gradually taking shape and will become clearer as coal increases its efforts.

The Bureau of Foreign and Domestic Commerce, in "Markets After the War," most authoritative work yet published on this subject, projects a national income for 1946, taking that as the first postwar year, of about $134,000,000,000. This compares with $119,000,000,000 in 1942 and an estimated $135,000,000,000 in 1943. The nation's history has shown that invariably the national income rises after a war and then recedes somewhat, never falling back, however, to the prewar level. There is no reason to believe that this curve will double-cross the forecasters after the war.

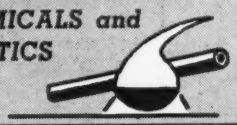
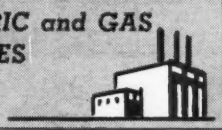
But even were the calculations on income in error, there are other indicators which show as conclusively that business should continue to expand. Discounting for the moment the efficiency factor, the real reason why tonnage failed until recently to continue its upward trend after World War I, coal always has followed those barometers closely. Railroad passenger miles and freight ton-miles both show large gains, and railroad men, figuring now on 1950 business, expect the business curve to maintain its upward trend. Electric power output has shot up almost phenomenally, and while it is extremely sensitive to the over-all picture, there is every reason to expect that the normal growth will continue and perhaps increase after the war. Pig-iron output, a barometer of heavy industrial activity, is at a peak, and, while some recession may be expected, the long-time picture forecasts continued gains in the future.

All these indications and all the economic prophets may be confounded, but at present it certainly would seem a safe assumption that the postwar era will see, if not the wartime peak demand, a continuation of the long-time upward trend in production of goods and services in this country and throughout the world.

What of the Future?

The question confronting coal is: what are its chances and what can it do to obtain its share or — happy thought—a little more than its share of the new business to come? It might not be too much to say that the greatest opportunity in history lies ahead.

What's Ahead for Coal in Major Markets

MARKET	PROSPECTS	NEEDED
CHEMICALS and PLASTICS 	GOOD as a fuel and energy, modest as a raw material	Research on raw material uses, better preparation
COLLOIDAL FUEL	INVITING for marine use; unpromising for other uses	Research to cut cost and improve the product
LIQUID FUELS	EXCELLENT possibilities in long run	More research and testing on commercial scale
DOMESTIC and SPACE HEATING	GOOD, despite strong competition	Better burning equipment; better preparation
RAILROADS	MIXED; traffic will increase but competition is strong	Better, or perhaps preferably new, locomotive design; better preparation
ELECTRIC and GAS UTILITIES 	EXCELLENT as a source of electric power; gasification promises large additional tonnage	Better stokers; better coal; research on improved, low-cost gasification
STEAM and INDUSTRIAL USES	GOOD in present fields with new applications promising substantial additional volume	Better combustion equipment; better preparation; more research to develop new uses

But any coal man who is deluding himself by thinking that all he has to do is to shake the limb to have the plum fall into his lap is due for a rude awakening. The maximum possible concentration on lower cost, higher quality and improved combustion equipment is an absolute necessity. A look at the competitive picture will explain why.

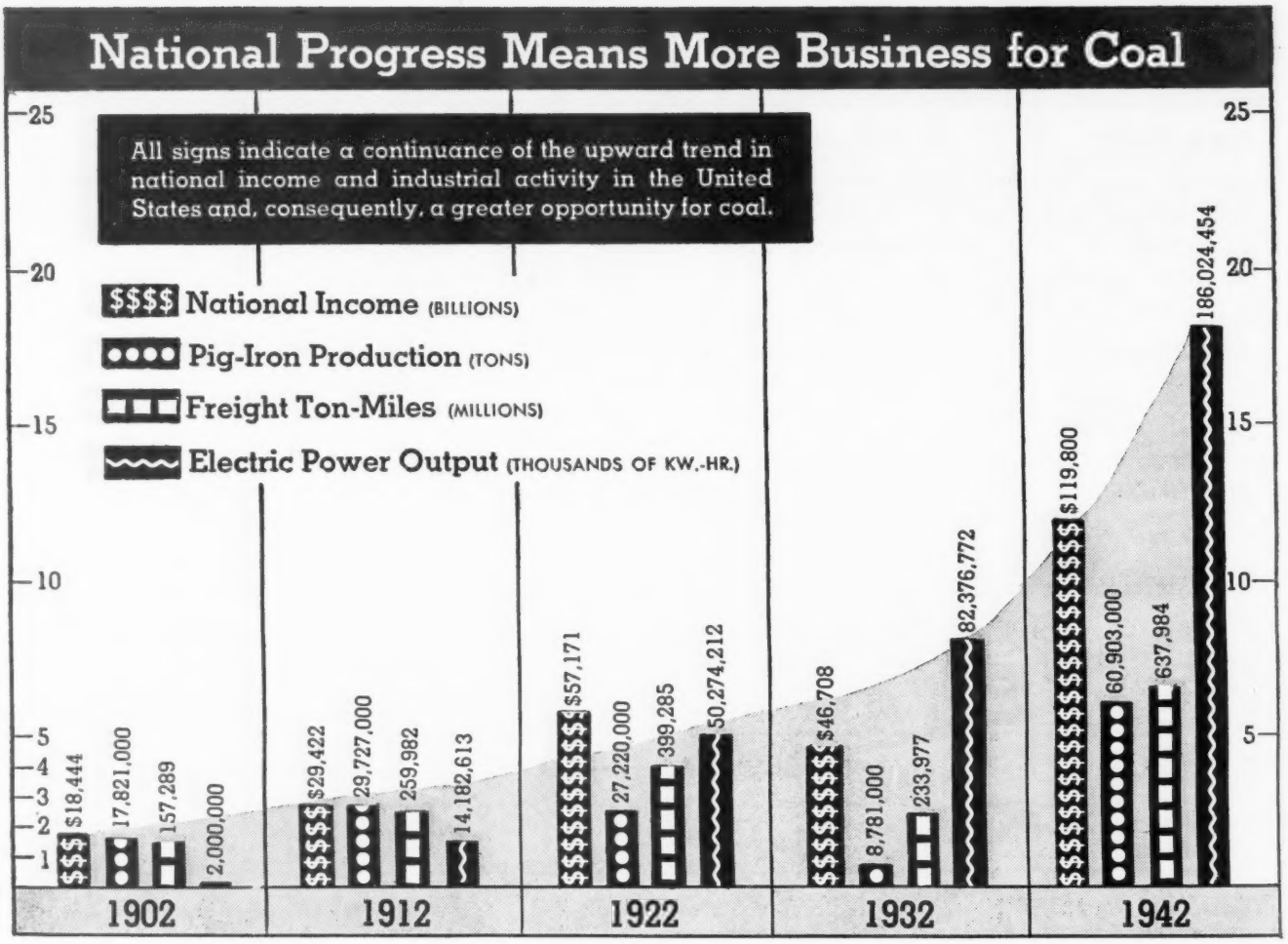
Oil is coal's toughest competitor—a competitor which has waxed mighty in the last 20 years by diligent exploitation of sales possibilities, unremitting development of better product and equipment, and a feline ability to pounce on coal's shortcomings. Natural gas undeniably is troublesome and may become more so, but its sphere of action is more circumscribed and, consequently, its opportunities are more limited—at least at the present time. Future developments in water power will reflect both economic and political influences. Where economy is the controlling factor, coal already has demonstrated, with some local exceptions, that it can win out.

Any discussion of oil these days winds up, if it doesn't begin with, a consideration of reserves. Many people —informed, uninformed and plain kibitzers—have been having fun lately making book on how long our supply of crude petroleum will last. Their guesses may or may not be important and vary so widely that it is all but impossible to arrive at an unprejudiced estimate. What is important, however, is the fact that much of it is guessing. But if the best available figures on discoveries and reserves are compared to production, crude's days would seem to be numbered in the United States. But it does not mean that oil has given up. Far from it. Oil still is worth all the steel that coal can summon.

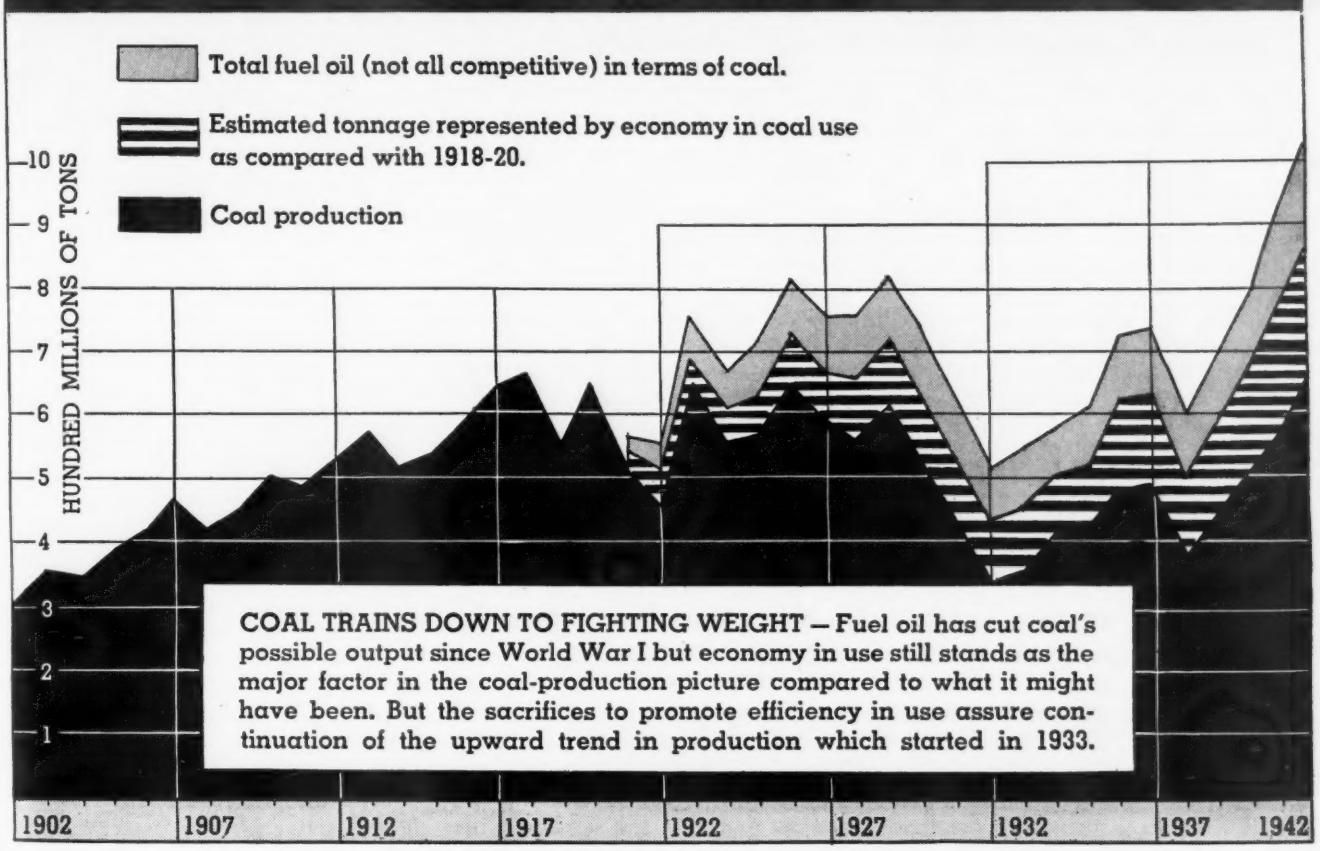
What we do know about oil is that we have been using more than we have been producing. Estimated known reserves as of Jan. 1, 1944, were 20,046,905,000 bbl., 698,739,000 bbl. less than 1943. In other words, we used more oil than we discovered. Production for 1943 was 1,495,000,000 bbl., against 1,409,000,000 in 1942.

The oil industry, of course, knows these figures and their implications. It, or at least some of its top men, believe that there will be a petroleum shortage not long after the war. They believe, or hope, that the exploitation of foreign markets will bring an adequate flow of crude for all purposes to the United States for many years. They hope the price will go up because, while rising prices may mean some consumer discontent, they also spur wildcatting and discovery. And they hope for another east Texas.

Whatever oil men believe, however,


National Progress Means More Business for Coal
All signs indicate a continuance of the upward trend in national income and industrial activity in the United States and, consequently, a greater opportunity for coal.
$$$$ National Income (BILLIONS)
Pig-Iron Production (TONS)
Freight Ton-Miles (MILLIONS)
Electric Power Output (THOUSANDS OF KW.-HR.)
25
20
15
10
5
4
3
2
1
$$$ $18,444
17,821,000
157,289
2,000,000
$$$$ $29,422
29,727,000
259,982
14,182,613
$$$$$$$$$ $57,171
27,220,000
399,285
50,274,212
$$$$$$$$ $46,708
8,781,000
233,977
82,376,772
$$$$$$$$$

How Economy and Fuel Oil Have Affected the Coal-Production Picture



COAL TRAINS DOWN TO FIGHTING WEIGHT — Fuel oil has cut coal's possible output since World War I but economy in use still stands as the major factor in the coal-production picture compared to what it might have been. But the sacrifices to promote efficiency in use assure continuation of the upward trend in production which started in 1933.

Chemicals and Plastics

PROSPECTS—As a raw material, modest, with some new uses offering a chance at business in some volume; as a fuel and source of energy, good.

NEEDED—More research to discover raw-material possibilities; major emphasis on making coal more suitable as a fuel and energy source.

While a major and growing market, the future for coal in chemicals and plastics has perhaps been obscured by undue emphasis on a less promising phase—the raw-material prospects. The chemical industry employs coke and gas and practically all the by-products of coking and other processing of a substantial volume of coal—in the neighborhood of 100,000,000 tons annually at the present time. But the number of coking or other processing plants operated solely as sources of chemical raw materials is very, very low. There will be more as the demand for chemicals and plastics increases, and it is conceivable that there might be a shift from operation primarily for coke and gas to operation for chemical raw materials in the future. For a time, however, it seems that plants producing primarily coke and gas will meet the demand.

Take plastics. Their use will increase and new organizations, such as "Mellitic Associates," will broaden the field of coal as a raw material for such products. Total production of plastics, however, is running some 300,000 to 400,000 tons annually, depending on definition, of which only a relatively small percentage is reflected in coal as a raw material.

Synthetic rubber is a new material which might mean a volume business for coal, although petroleum and grain alcohol seem to have the inside track for the present. There are other opportunities—all, however, of a speculative nature.

Coal's greatest opportunity in the chemical, plastic and related fields, taken all in all, seems to lie in fuel and energy for steam, heat and power. The chemical industry expects a 74-percent postwar increase over its 1940 market, with a corresponding increase in coal for energy as well as raw material. Soda-ash production, for example, uses 0.095 to 0.11 ton of coke per ton as a raw material. Coal for boiler use ranges from 0.25 to 0.5 ton, and for drying, from 0.16 to 0.25 ton per ton of soda ash. Production of soda ash has increased from 1,708,000 tons in 1923 to 4,523,000 tons in 1943, and undoubtedly will continue to climb. In varying degree, other chemicals and plastics have shown the same trend, with corresponding gains in use of coal as necessary as a raw material and as a source of heat, steam and energy for processing.

While the prospects for coal as a raw material are on the modest side, they nevertheless would be gains, and the industry should not neglect its opportunities in this direction. But major emphasis on making coal more suitable for processing, and thus more competitive with other possible fuels, appears to be the course promising the greatest volume.

CONTINUED ON NEXT PAGE

Colloidal Fuel

PROSPECTS—Not too attractive, with marine use possibly the best.

NEEDED—Research to reduce cost and make product stable.

This is another market about which there has been considerable talk but not much production. Most authorities to whom *Coal Age* mentioned the subject dismissed it lightly. The reason, in general, was the economy factor. Colloidal fuel, so far at least, is expensive. The only markets where it would have a chance are those in which the user had to have a liquid fuel and could not obtain all the oil he wanted, or where fuel storage space is a determining factor. Thus, the marine market might be worth while. Locomotive builders and railroad men treat it casually. It saves no more than 40 percent of the normal volume of oil used, it still has several "bugs," such as suspension of the coal in the oil and fly-ash, and it remains, for the present at least, expensive. But it does have a higher heat content per unit of volume, which makes its possibilities in marine service attractive.

Liquid Fuels From Coal

PROSPECTS—Attractive in the long run, depending upon oil supplies.

NEEDED—Research and commercial-scale production to explore possibilities and reduce cost.

Sharp declines in oil discoveries, coupled with growing demands for liquid fuels, have focused major attention on methods of producing such fuels from other sources, such as coal, oil shale and tar sands. National security, if nothing else, dictates perfection of such a process or processes. Coal is a logical source and occurs in or close to the major consuming areas.

The feasibility of producing gasoline and other liquid fuels has been proved; witness commercial production in Great Britain, Germany and other countries. Cost will be a major consideration, but there is every evidence that it can be reduced on volume production; and if oil prices should rise, the incentive would be even greater. At three to five tons of coal per ton of gasoline (approximately 75,000,000 tons consumed in 1942), including coal for steam, heat and power, any appreciable production of synthetic motor fuel would entail a sizable tonnage of coal. Coal, therefore, should encourage and support research and development on a major scale to make sure it has the inside track when the time arrives.

Domestic and Space Heating

PROSPECTS—Good, although competition is severe; will be better as improved coal-burning equipment is developed.

NEEDED—More research and development of convenient and efficient handling and burning equipment; better preparation of coal for home use.

The domestic market is the "cream of the crop" for bituminous, absorbing at present over 100,000,000 tons a year. It is the main market for anthracite—some 80 percent of the annual tonnage. Keen competition characterizes this market, with oil as the principal rival of coal. The interest of Bituminous Coal Research, Inc.; Anthracite Industries, Inc., other research organizations, producers, distributors, railroad and equipment manufacturers, therefore, is understandable. Even before the war, although oil was making gains, this research work and improvements in coal quality were paying dividends to coal and allied interests. But while prospects are good, the battle has by no means been won for coal.

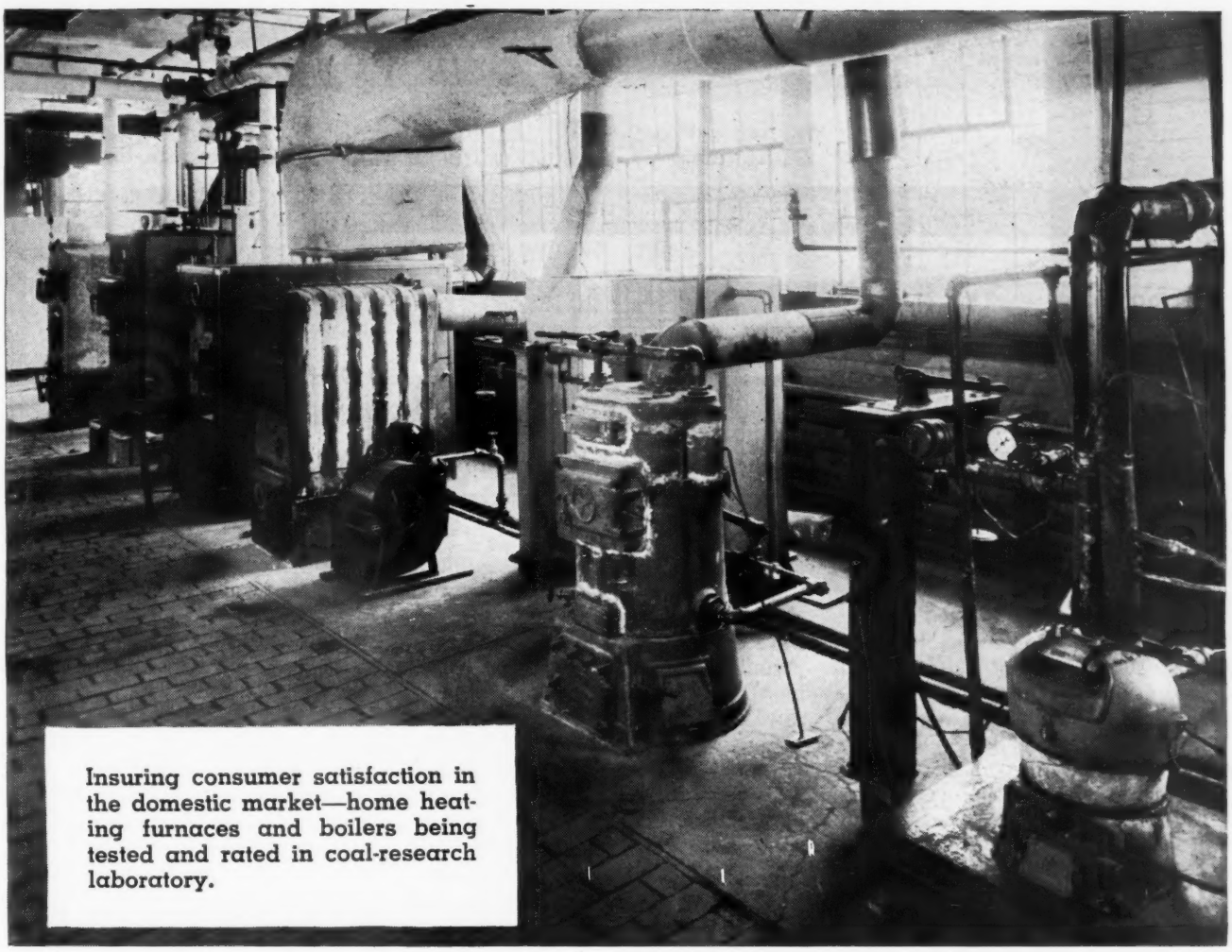
Take the matter of new homes. Coal's record before the war was not too good in this respect, although improving. After the war, the government estimates that there will be a shortage of between 4 and 4½ million housing units, with a heating and cooking apparatus market of $814,000,000. Other estimates vary up and down but all indicate a large-scale demand.

Cooling and humidifying in summer is an additional prospect. Some progress has been made on the necessary equipment, but it is by no means perfected and so far has been expensive to install although cheap to operate. But there is the prospect that installation cost can be reduced sufficiently to give it a chance in comparison with gas or electrically operated units. Summer cooling and conditioning offer a chance at a relatively high tonnage, aside from that involved in electric power or manufactured gas for the same purposes. Development of a low-cost all-year-round heating and cooling unit which can be operated economically on coal consequently is something well worth investigating.

To return to the heating market, the question is, How much of the new business can coal get while holding onto the old? It depends in large measure on the heating apparatus which can be marketed immediately after the war.

Anthracite naturally has gone deeply into the problem, concerning itself as much or more with the characteristics of the product as with the equipment in which it is burned, on the theory that the more they know about coal and its combustion the better position they will be in to advise the equipment manufacturer. The whole end of the exhaustive work being done at Primos, Pa., by anthracite's research technicians is summed up in two words, "customer satisfaction." That means equipment with less attention interval, with better heat control, with less manual labor, still furnished at a cost which oil will find it difficult to meet.

So simple a matter as the proper grates for a stove has been honored by months of experimental work so that Mrs. Jones can shake them without either breaking her back or losing her temper. The answer was found in rounded grates which a piece of unburned coal cannot jam. A grate, the laboratory held, should be an instrument to shake the ashes from the fire pot, not to attempt to crush the coal. The principal characteristics which the laboratory looks for in any piece of equipment—stove, range or stoker—are ash-handling facilities, attention interval, convenience, appearance, cleanliness and durability.



Insuring consumer satisfaction in the domestic market—home heating furnaces and boilers being tested and rated in coal-research laboratory.

Stoker tests are being run constantly in an endeavor to learn what sizes and types of coal burn best and to reduce ash handling and attention interval. Laboratory officials believe that a completely automatic, medium-priced stoker will be available for the postwar trade, but warn it needs exhaustive tests. They are being made; so far with satisfactory results.

A vertical, mazagine-type fireplace for burning anthracite is another development at Primos, together with a new type of water-jacketed coal-burning range, which the laboratory dietitian tests daily in efforts to lessen the time to bring the temperature up to cooking heat.

The matter of attention interval receives as much of the staff's attention as any phase of their experiments. Exhaustive tests have been run on banking with the firebox door open; they show less draft and longer burning, one test running ten days without attention. As a result, putting the check draft in the firedoor instead of in the stack is recommended.

Battelle Memorial Institute, handling much of the Bituminous Coal Research program, has had to meet the smoke problem in running tests on bituminous space heaters. This problem, as more cities enact abatement ordinances, becomes increasingly important. They have ready for postwar use a completely smokeless stove, and a design of 27 different stove makers is now receiving field tests in 20 different spots throughout the United States. After being banked for four days, the stove will go from 50 to 74 deg. in 40 minutes.

Battelle officials also believe that a cheap stoker is needed, and while they admit that automatic ash removal is expensive, they insist that it is necessary if coal is to compete with oil. At present they are engaged on tests with an overfeed automatic stoker which eliminates most of the smoke by a jet flame which consumes the gases as soon as the stoker goes on. Automatically agitated grates are provided.

Along with improvements designed to promote the use of coal in its solid state, coal and research men are eying also the attractive possibilities in converting coal to a powdered, liquid or gaseous state for domestic use, thus attacking the problem from still another angle. Gasifying coal offers perhaps the greatest possibilities from a convenience standpoint.

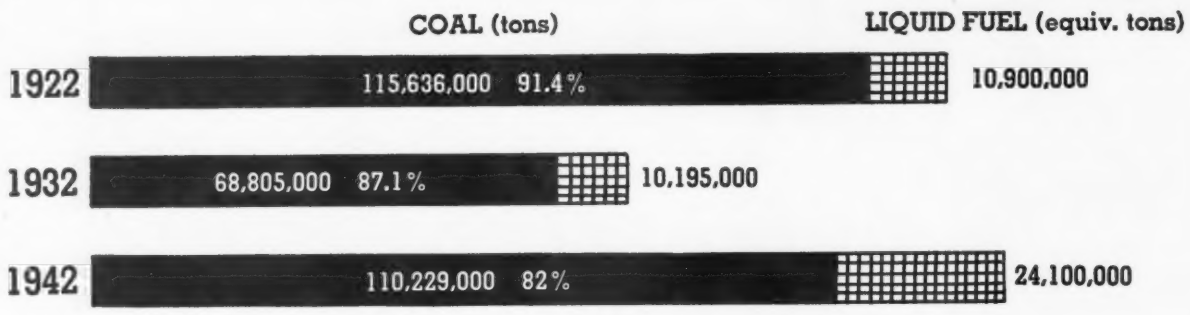
Railroads

PROSPECTS—Mixed; coal should benefit from increased traffic but must face the prospect of increased inroads by diesel equipment.

NEEDED—A more efficient locomotive design or, perhaps preferably, an entirely new design; also better-quality coal.

The railroads, which in 1942 consumed 110,000,000 tons of coal, thereby becoming the industry's largest individual customer, offer both possibilities and problems—the former growing out of prospects for greater

Coal and Oil For Locomotives



Diesel power accentuates competition already offered by oil-fired steam locomotives.

traffic and the latter out of the trend toward diesel power. Railroad men themselves, however, are not yet sure as to how far diesel locomotives will replace steam. The oil picture, assuming a continuance of supplies as in the past, probably will not change greatly, with carriers in or close to oil-producing centers probably continuing to use oil in about the same proportions as heretofore. Diesel, however, is another matter. But the picture is far from hopeless. In fact, it is relatively good, and some work on coal's part in promoting new locomotive designs and improving coal can make it better.

Railroad men generally are making their plans to include business in 1950. The projected figures indicate a railroad equipment market 170 percent better than in 1940. Railroad executives look for some drop in passenger travel due to self-operated vehicles and, where speed is essential, to the airplane, but expect an increase in freight over the prewar era and profess no fear of air inroads on freight traffic.

Very frankly, what is needed to put coal in the best competitive position in the railroad market is not improvement but a new design. One locomotive research technician said that if George Stephenson could come back today he would recognize for basically his original product the best steam locomotive now built. In other words, improvements have been made, but basic design has not changed in a century or more. The result has been an almost appalling lack of efficiency on the part of the steam locomotive, despite the improvements that have been made, an opening quickly seized by diesel exponents.

Coal recognizes this, and while progress has been made in smoke elimination (through steam air jets which ignite the volatile matter quickly) and in fuel consumption, research men are placing more faith in designing a water-tube boiler with turbo-electric drive than in fiddling with the old models. Water-tube boilers would permit higher temperatures and hence more efficiency, and the turbo-electric drive would eliminate or reduce the track wear common with the conventional steam locomotive. Still farther in the future is the gas-turbine locomotive fired with coal, which experts at Battelle believe could deliver a 30-percent efficiency—higher than anything claimed for the diesel.

But the immediate problem of competition with the diesel can be met by further improvement of existing steam models and better coal. Electric locomotives are not necessarily a competitor of coal, since railroad men agree that the power would be generated by coal in most instances.

The high investment cost of the diesel is offset, its champions say, by economy in operation. In that connection testimony in the so-called "Diesel Case" before the National Railway Labor Panel Emergency Board is enlightening. It included a comparison, for the first six months of 1942, of the cost per locomotive mile between the Santa Fe's Class 3765 passenger steam locomotive and the road's 6,000-hp. 3-unit diesel, as follows:

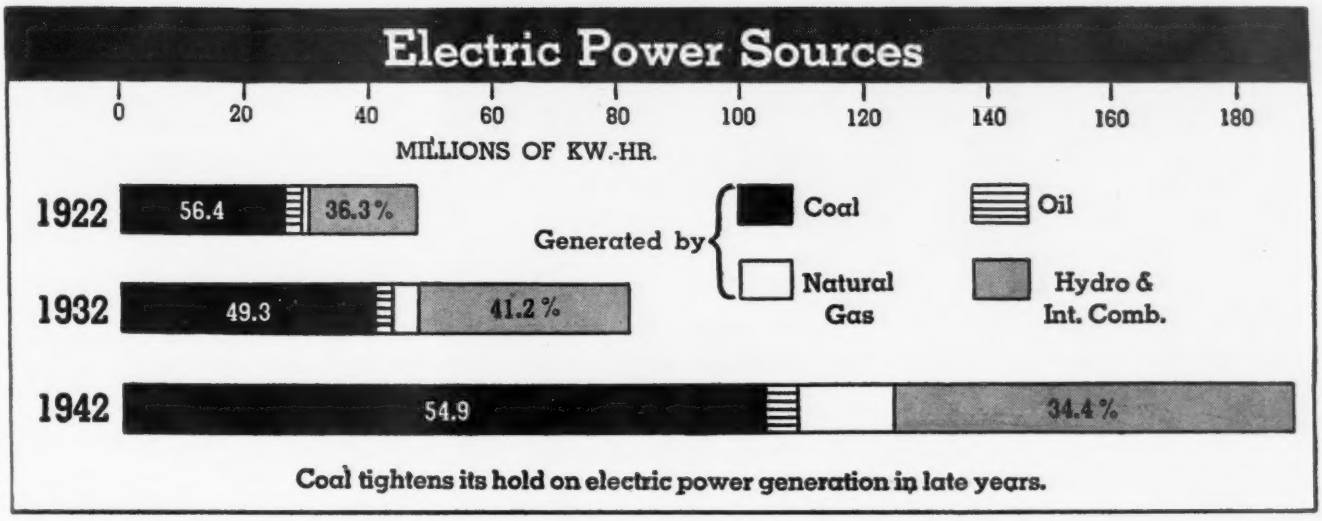
CENTS PER LOCOMOTIVE MILE

	Steam	*Diesel*
Repairs	$0.2513	$0.2735
Depreciation	0.0453	0.1325
Enginemen	0.1473	0.1555
Fuel	0.1828	0.1738
Lubrication	0.0155	0.0357
Water and other supplies	0.0181	0.0120
Enginehouse Expense	0.0200	0.0291
Total	$0.6803	$0.8121

It might be noted that wages of enginemen would have increased considerably in the diesel column had the Brotherhood of Locomotive Engineers been able to put across the project for a full crew on each unit.

The diesel, unquestionably, has some advantages over coal. This is true particularly in switchers, where the diesel takes little time to warm up and wastes no fuel while idling. Turnaround is another factor which favors the diesel, but it must be kept in mind that turnaround is important only where the traffic will bear it. For instance, the New York Central's New York–Chicago trains arrive in the morning and do not leave again until night. This is a traffic factor and no mechanical or technical improvements will alter it. On short trips turnaround is important, and the New York, New Haven & Hartford has found using diesels for freight one way and passengers the other an economical arrangement.

There is, however, no question that coal must assist in improving the design of the steam locomotive if it wishes to maintain or improve its standing in the railway field. Railroad men are thoroughly testing all three sources of power—coal, oil and electricity. When all other considerations have been eliminated, they admit it will come down to a question of economy of operation. Even now, coal can give a good account of itself on the score of economy. But if efficiency with coal could be increased even 50 percent, or perhaps doubled, making it, say, 7½ to 10 percent over-all at the drawbar, coal would be very difficult to displace. Fortunately, both coal's research men and locomotive designers recognize this and are doing something about it. But the need is pressing and coal must push its work to better its position.



Coal tightens its hold on electric power generation in late years.

Electric and Gas Utilities

PROSPECTS—As a source of electric power, good now and in the future; as a source of gaseous fuel, large potential market.

NEEDED—Better coal and better stokers; development of equipment for production of low-cost high-B.t.u. gas.

The public utility picture favors coal more than any other fuel. Utility men hesitate to forecast what the use of power will be, but the trend is definitely up. Some indication of what the electric power market will be like after the war may be gleaned from the prediction of $1,200,000,000 to be spent for electric appliances, an increase of 130 percent over 1929. And the Department of Commerce estimates the electric power output in 1946 at 220,000,000,000 kw.-hr. In 1940 it was 145,000,000,000 kw.-hr.

Almost unanimously, except in sections where another fuel or water power is readily and cheaply available, utility men declare that more and more coal will be used to generate electric power. What they want is a better stoker, particularly one that will dispose of the ash to a pit or dump pile without manpower. And they ask a better product, better prepared and more consistent. If coal can continue to fill the bill, and there is no reason why not, it can continue to enjoy the business and head off natural gas as it has headed off oil and hydro in the period to date.

Equally or more interesting to coal, however, than use for electric power is the possible manufactured gas market. It opens up a field that hitherto has offered considerable competition to coal while at the same time utilizing a part of its output.

Here, in plain words, is what the postwar planning committee of the American Gas Association has recommended:

"The basic aim of our industry should be the making of the energy in coal available in ashless form, in the most convenient forms needed for society, which is gas distributed in pipes for non-mobile heat requirements, and in the form of liquid fuels for motor and airplane use. Any research which is in keeping with these objectives should have the support of the gas industry."

One leading planner in the manufactured-gas field states that manufactured gas for heating purposes answers all the questions now being studied in coal research laboratories—ash disposal, shoveling, regulation, shaking and attention.

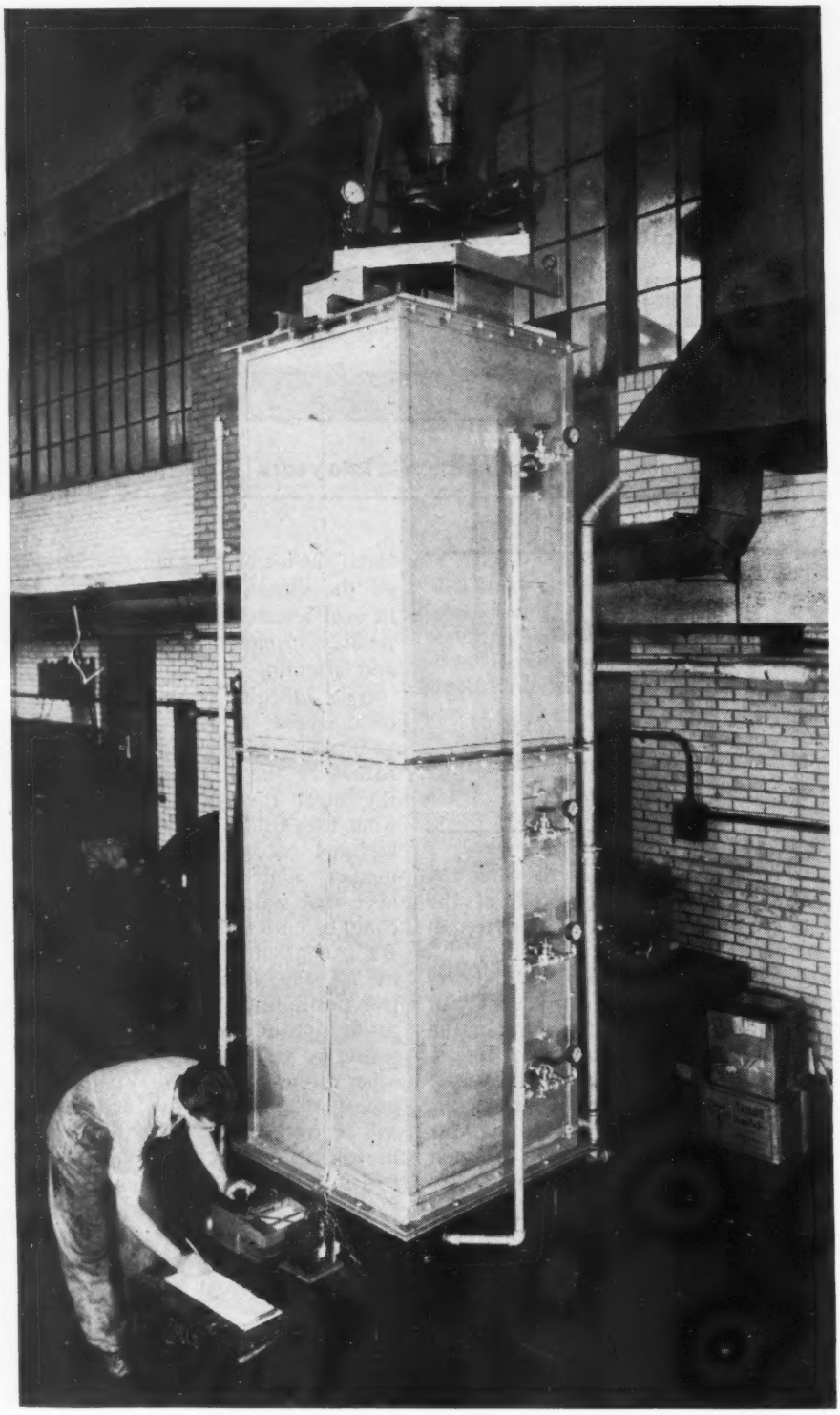
The difficulty, of course, is disposal of the coke, at least until complete gasification is achieved. Utility companies, as one of their executives put it, "meet themselves coming back" when they try to dispose of both manufactured gas and coke in the same market. Some of their technicians believe that water gas made from coke could be enriched from its present 300 B.t.u. content to be suitable for city use. A step offering even more attractive possibilities is complete one-step gasification of coal, now under investigation by the bituminous industry and other interested parties. Whatever the process may be, and one undoubtedly will be worked out, the willingness of the gas utilities to act as salesmen for coal in an ashless form should not be overlooked by the coal industry. Under those circumstances the gas industry is no longer a competitor in part but a very lively ally in toto.

Steam and Industrial

PROSPECTS—Good in present fields, with new applications holding out promises of substantial additional volume.

NEEDED—More research to improve combustion; better preparation; more research to develop new uses, equipment and processes.

A broad market and, somewhat difficult to define exactly, steam and industrial use includes general manufacturing and processing of a wide variety of materials requiring energy for steam, heat and power. Depending upon the definition, it takes in coal for furnace and foundry coke, cement mills and fuel and power for chemical production, as previously discussed. Thus, it is responsive not only to general increases in business activity but to par-



Developing a powerful new tool for expanding coal use—equipment for research on the complete gasification of coal.

ticular increases, such as a greater use of steel and cement in construction.

With a good outlook for general business and industry, the outlook for coal is equally good. As much as any other, this market is concerned with the cost sheet. That gives coal a decided advantage, and coupled with the fact that no large user of fuel is going again to take any chances on a supply, gives it comfort in still another direction. How great a market will exist depends largely on general business conditions. The Department of Commerce figures a gross national product of $142,000,000,000 for the postwar era, compared with $97,000,000,000 in 1940.

Experimentation with pulverized coal, which Battelle believes will be the fuel of the future, is being pushed at the Columbus laboratories and at others interested in coal utilization. Work with pulverized coal in radiant-tube boilers, tests on new models of industrial stokers and research into the characteristics of coking coals are all receiving the attention of Battelle technicians, as well as technicians at other laboratories. But without much doubt the most interesting development is a non-steam use—pulverized coal in open-hearth steel furnaces. Battelle scientists say this could mean a market of 20,000,000 tons annually for coal, and insist that the engineering is no insurmountable feat. The use of a waste heat boiler to reduce gas temperatures, elimination of regenerators and possibly a new design of checkers are the principal steps involved. A prejudice factor enters into it, however, since steel men had an unfortunate previous experience with slag accumulation when pulverized coal was used. This has now been overcome, but the steel men have to be shown.

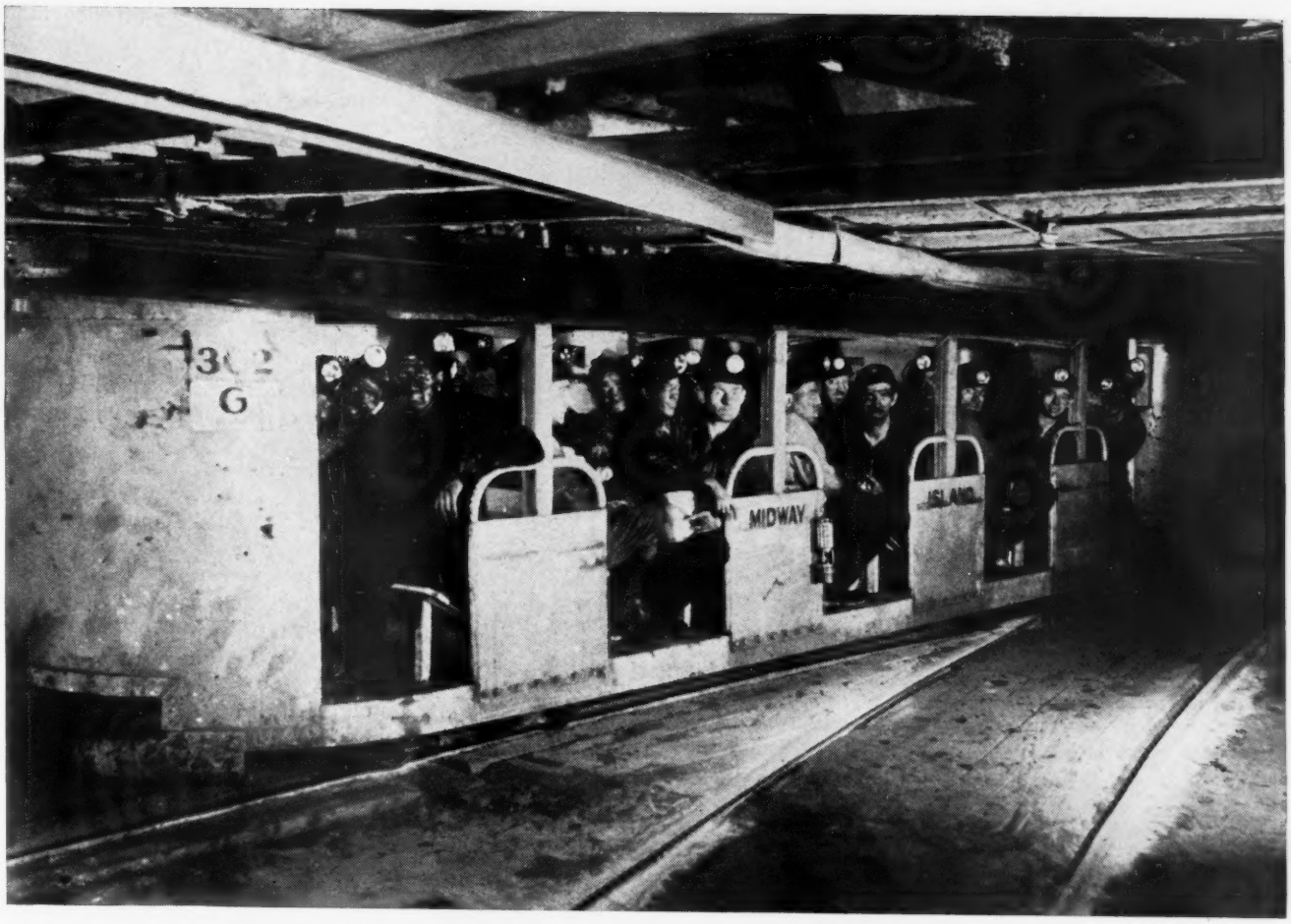
One Battelle expert estimated that as much as 50,000,000 tons a year could be gained for coal in residential and non-steam uses, such as forge furnaces, ceramic kilns and metallurgical.

Last year bituminous coal produced 589,000,000 tons; anthracite, 61,000,000. This year the ante has been raised to 620,000,000 for bituminous and 65,000,000 for anthracite. A drop from the wartime peak may be expected immediately after hostilities cease, but the important fact is that the future trend will be upward. Those who have made a study of coal markets, its new uses and its improved old uses, believe that coal can hold or increase its share in heat and energy used in the United States, which, after all, is the vital factor.

Selling Necessary

Many imponderables enter into the discussion, not the least of which is how much the industry itself wants to sell its product. The markets where it knows it has outlets cannot be increased just by wishing for it. Residential users must be sold on coal before they will buy it. The industry's research men and technicians are hard at work to improve both the product and the burning equipment. They need and deserve the industry's support.

There is no reason why coal cannot share in the postwar prosperity that all experts envision. The markets are there. The preponderance of factors favor coal. But the industry must be ready to take advantage of the breaks when the time comes. The best way to prepare is to plan for them now.



Cars 25 ft. long (coupling to coupling) carry 38 men comfortably seated and protected from roof, water, trolley wire and, to a large extent, dirt and cold air.

SPECIAL CARS AND TOOLS

Help Boost Tons Per Day and Per Loader

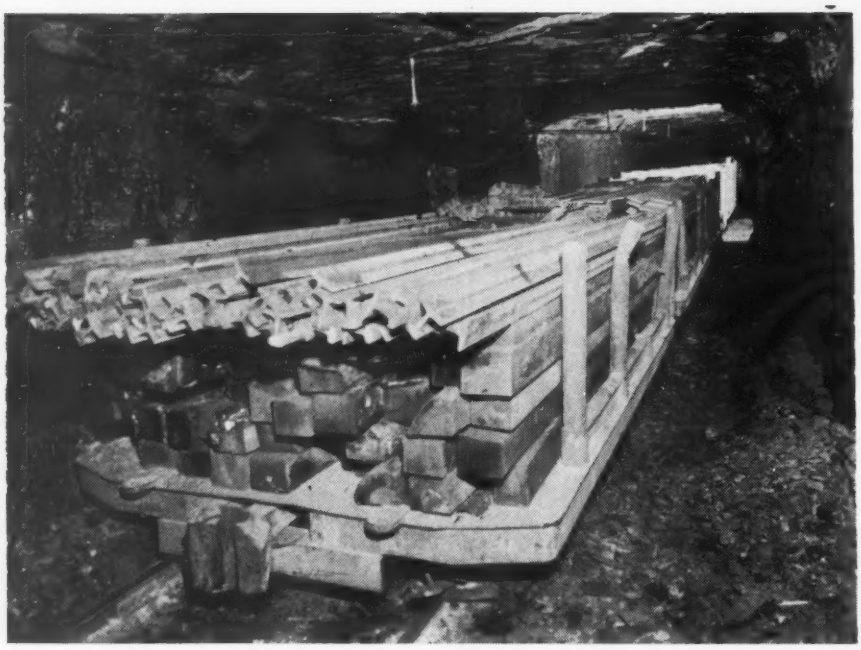
Labor Shortage Offset in Part by Specially Designed Car Equipment—Mine Performance Better in Each of Last Two Years—Cars, Trucks and Tools Are Provided for All Recurring Jobs

By J. H. EDWARDS
Associate Editor
Coal Age

RAISING production per day and per loader-shift at a large full-mechanical mine during each of the last two years and continuing three-shift operation during that time is an accomplishment indicating a high degree of efficiency in service of supplies and maintenance. At that mine—Isabella, Weirton Coal Co., on the Monongahela River at Isabella, Pa.—special mine cars, push trucks and self-propelled units provided for every important service and transportation job underground are credited with a part in offsetting the general shortage of labor. These special cars include about 30 types and over 100 units.

Because the cars which transport the coal from loading machine to slope bottom are large, deep and costly (but not expensive per ton carried) it is reasonable that instead of tying up these cars for carrying men and supplies, special cars suited far better to the specific jobs and in some cases less costly per unit be added to the mine equipment. But the primary objective is the efficiency, dispatch and safety so necessary in maintaining in top-notch condition the machinery and the working sections for three-shift operation.

In this mine, recovering 7 ft. of the Pittsburgh seam and operated entirely with Whaley Automat loaders, track gage is 44 in. and the average haul is about 3 miles each way. The coal cars are Differential eight-wheeled units



Thirteen of the track and timber cars are the eight-wheeled low type with four removable bolster stakes on each side.

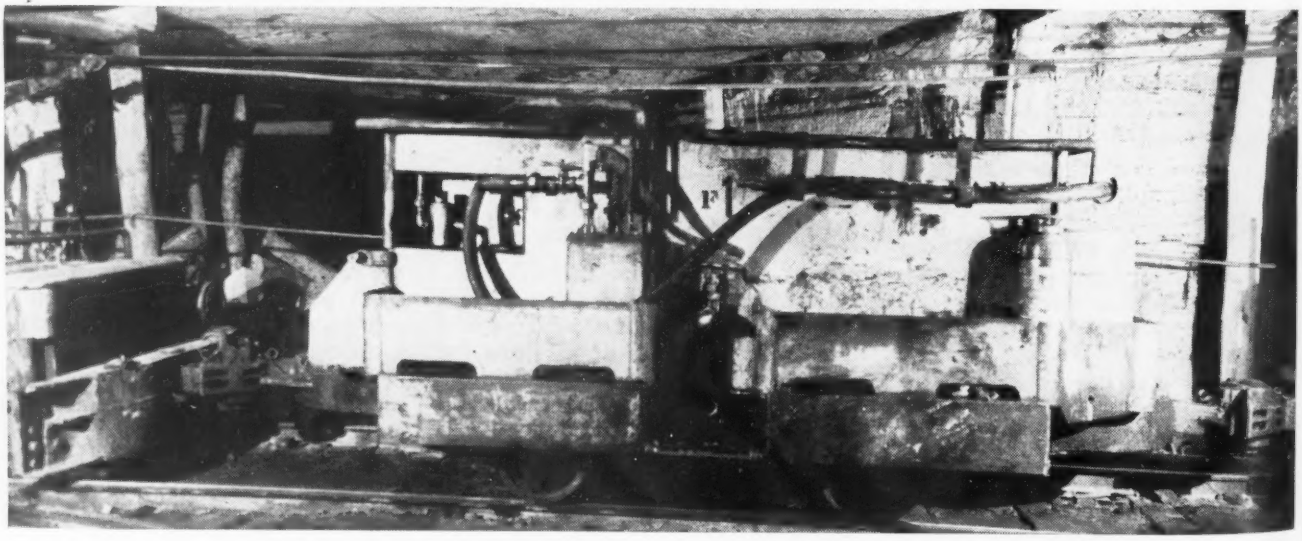
Ten tons of sand ready to go down the slope. The eight-wheeled chassis facilitates unloading into the sand boxes in the mine.

with four "axless" two-wheeled independent side trucks. While their capacity nominally is 10 tons, the average loading for the mine is 9.3 tons, although some of the cars in the sections of greatest height are loaded to exceed nominal rating.

These cars, installed in 1937, were the first of that size in a United States coal mine (*Coal Age*, July, 1938). Weight is 7,760 lb. and the outside body dimensions are: length, 14 ft. 4 in.; width, 7 ft.; height above rail, 48 in. at the high end and 36 in. at the loading end. If used for carrying supplies, the height of the car, or, putting it another way, the depth of the body, makes it inconvenient for loading and unloading, thus slowing the work and leaving more chance for minor accidents.

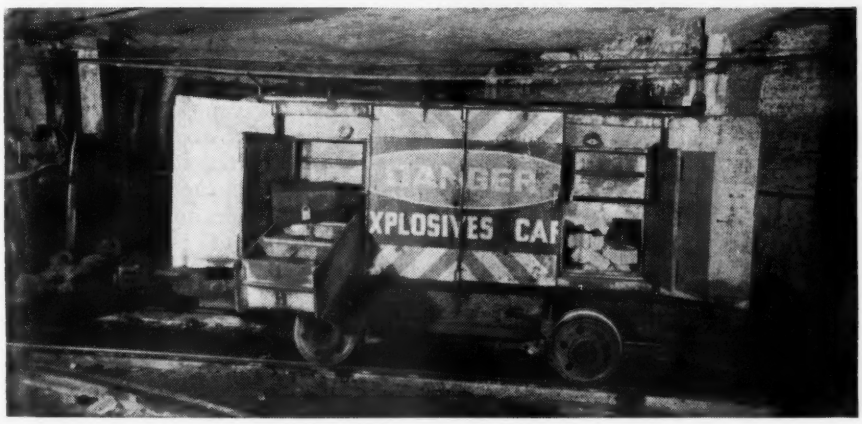
For several years after the jumbo cars were installed the men were transported in trips consisting of old wooden cars refitted to accommodate six men each, although at times the jumbo cars, carrying a maximum of twelve men each, were used. To provide a safe and more compact trip with men occupying the side under the trolley wire, eight new special man-trip cars were purchased. These cars, described in *Coal Age*, November, 1942, likewise are an eight-wheeled type but are covered over the top to shield the men from roof, trolley wire, water and largely from dust and cold air. Coupling length of the car is 25 ft.; canopy height, 62 in.; width, 75 in.; maximum seating capacity, 36 men. Two man-trips leave the bottom, consisting of three and five cars respectively.

Materials and supplies are taken into the mine on a 14-deg. rope-haulage slope 700 ft. long. For the heavier and bulkier materials such as timber

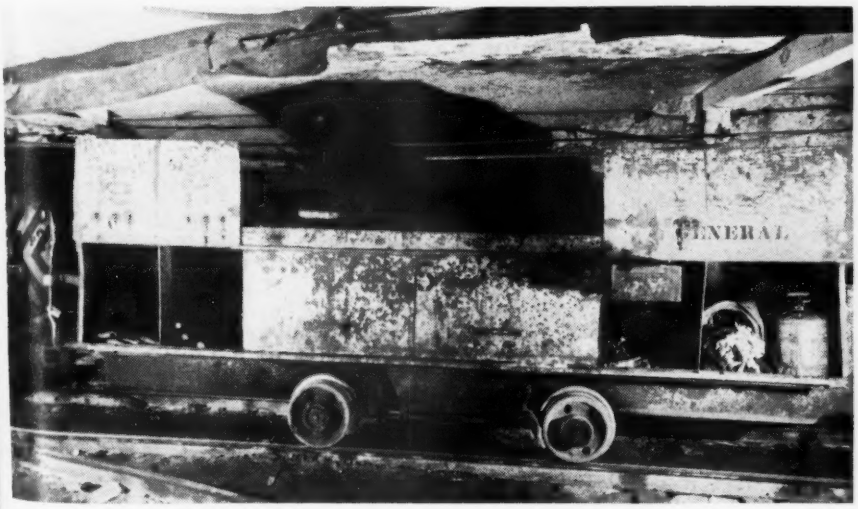


Oil and grease supply car is equipped with two tanks, motor-operated force pump and filling hose and fire extinguisher.

Powder car has steel body, sliding doors and non-insulated couplings. Interior is lined with alternate layers of wood and rubber.



Detonator car has steel-shielded body and non-insulated couplings. The steel doors are opened to show wood and rubber lining, partitioned drawers and locked leather box.

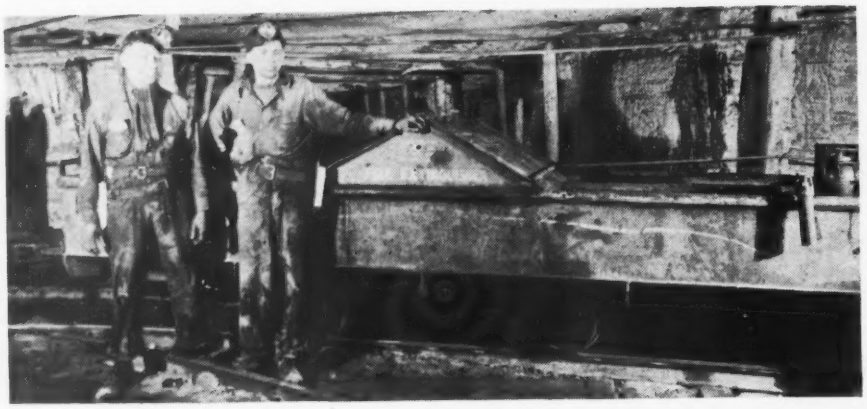


Tool car has compartments for each section of the mine and one for "general." Bits are carried on top of the deck.

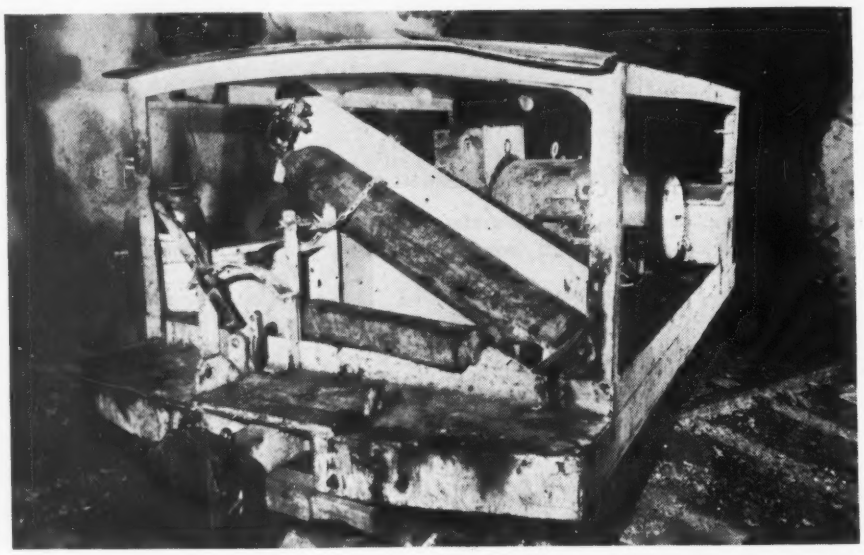
and rails a fleet of 13 special eight-wheeled flat cars with removable bolster stakes of 3-in. pipe have been purchased. Although these cars have the same chassis and over-all length as the jumbo cars, their flat bottoms and the absence of sides and ends make them less costly. As the accompanying illustration indicates, construction with four removable bolster stakes per side provides for maximum convenience in handling materials. Seventeen other track and timber cars are in use. They are the older four-wheeled construction and do not stay on the track nearly as well.

Two other eight-wheel cars (one with the label "Motor Sand" shown in one of the illustrations) carry 10-ton loads and have 10-in. truck wheels which help provide the low height so convenient in shoveling the sand out and into boxes in the mine. The normal locomotive sand requirement for the mine is 10 tons per day; therefore, two cars serve very well for this duty, as one is inside distributing sand while the other is outside being loaded.

Oils and liquid greases are distributed with one four-wheeled car fitted with a motor-operated force pump and filling hose. This car has two tanks—750 and 400 gal. capacity. A Foamite extinguisher is part of the equipment. This car is loaded with oil and grease at the oil house on the outside so that these are never exposed to dirt. In the mine likewise both oil and grease are pumped into containers so that there is no contamination. Grease goes into special filler cans from which hand



This open-type mine scrap car has one covered compartment at the center for carrying fire-fighting equipment.



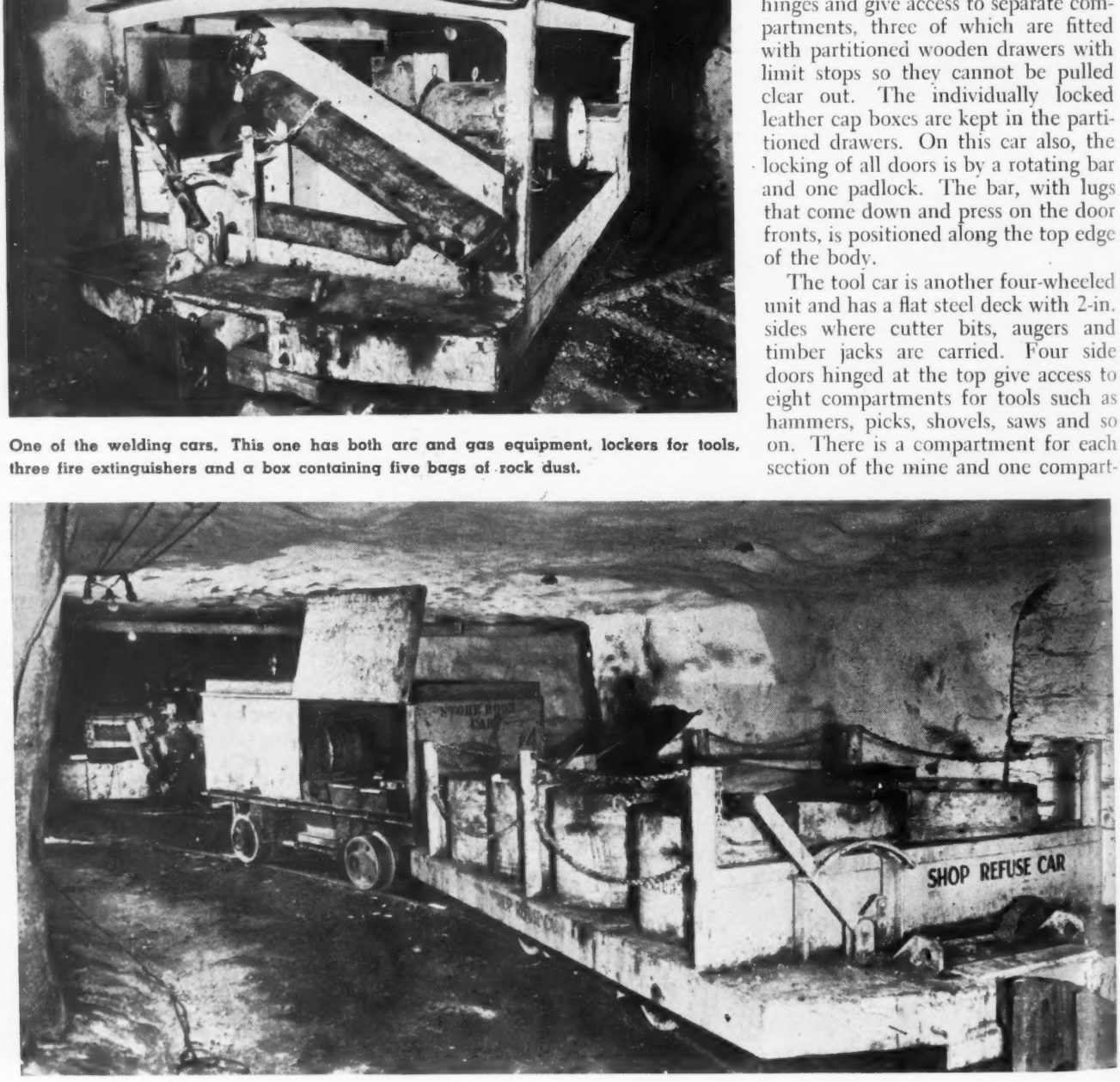
One of the welding cars. This one has both arc and gas equipment, lockers for tools, three fire extinguishers and a box containing five bags of rock dust.

guns are loaded without exposing the grease.

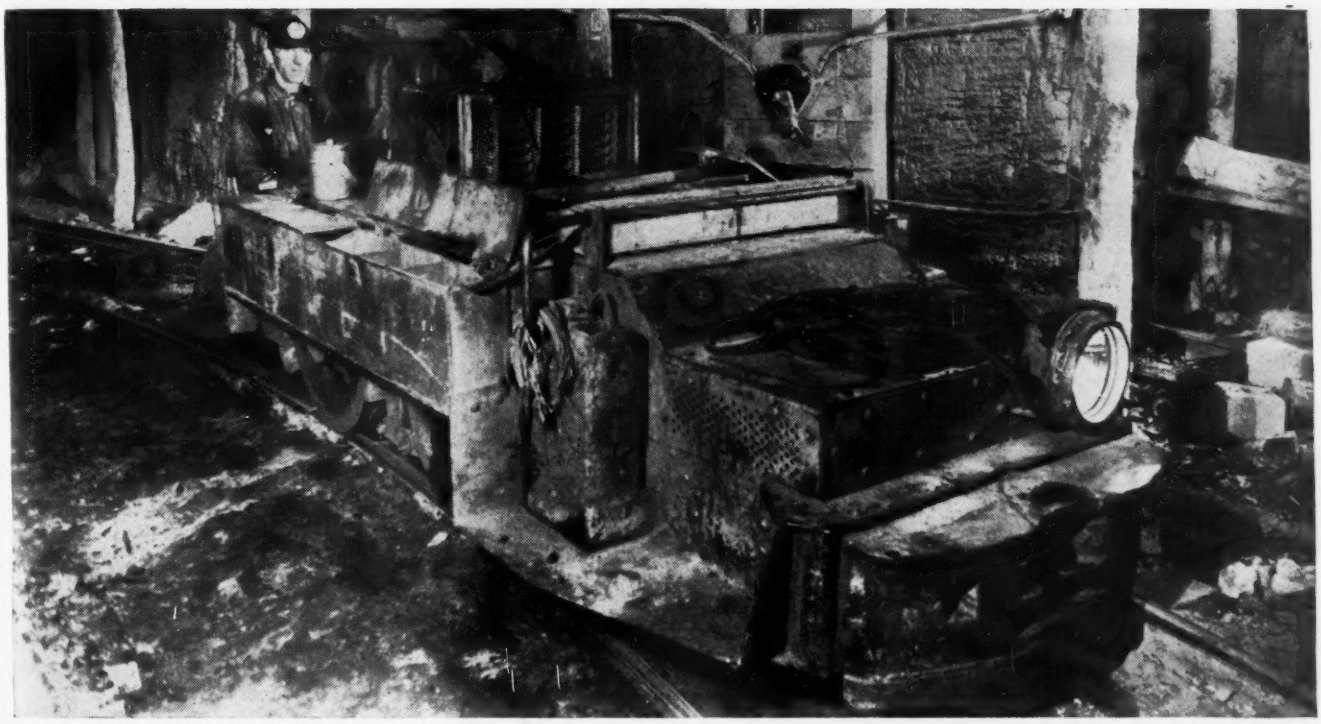
Two explosives cars, one for permissible powder and the other for detonators, follow the principle of roof, collision and electrical protection by complete shielding of welded steel and an inside lining of alternate layers of tongue-and-groove wood and rubber sheets. On these shielded cars the couplings are not insulated, as this would be superfluous with that type of construction. Bodies are spring-supported and the two sliding doors are secured by lugs on one long shaft that is rotated and padlocked at one end. Automatic couplers with spring and friction draft gear minimize haulage shocks.

Doors of the detonator car have hinges and give access to separate compartments, three of which are fitted with partitioned wooden drawers with limit stops so they cannot be pulled clear out. The individually locked leather cap boxes are kept in the partitioned drawers. On this car also, the locking of all doors is by a rotating bar and one padlock. The bar, with lugs that come down and press on the door fronts, is positioned along the top edge of the body.

The tool car is another four-wheeled unit and has a flat steel deck with 2-in. sides where cutter bits, augers and timber jacks are carried. Four side doors hinged at the top give access to eight compartments for tools such as hammers, picks, shovels, saws and so on. There is a compartment for each section of the mine and one compart-



While the car in the foreground is in the underground shop to be loaded with refuse, another like it is on the outside being unloaded, which is simplified by the use of cans.



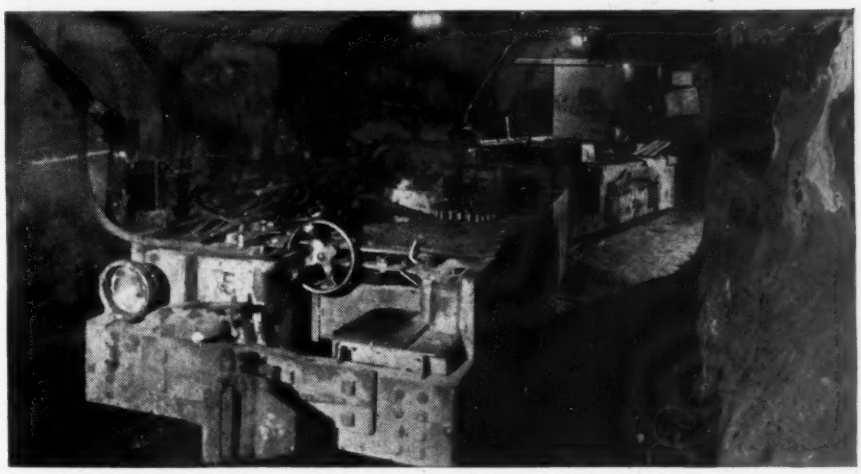
This wire crew's "jeep" has steel boxes built along the side for tools and supplies.

ment for general tools. On this car the locking bar is along the top edge.

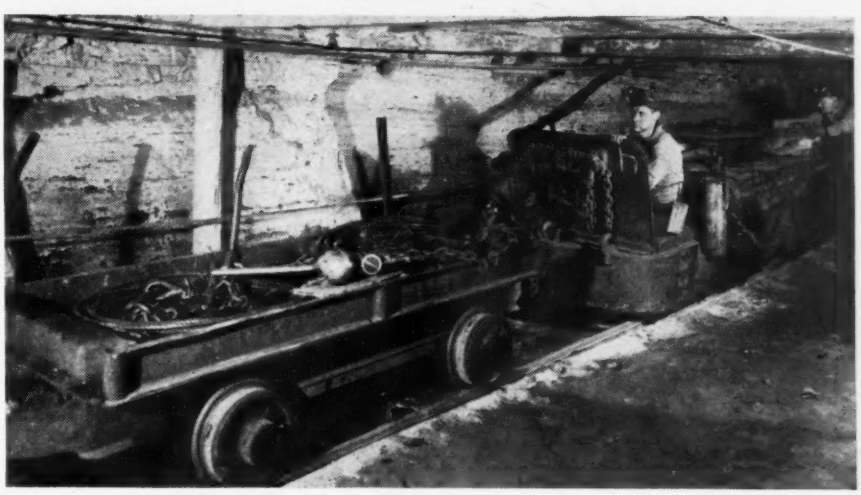
Mine scrap, miscellaneous track parts and like materials to be repaired are collected and hauled to the outside in a four-wheeled car with a covered center compartment and open-top boxes extending to the ends. The center contains extinguishers, sacks of rock dust and a few tools for fire fighting. For more serious fires a special fleet of cars—described hereinafter—is kept on the main bottom.

Considerable labor in unloading to the dump heap the sweepings and miscellaneous refuse from the central shop at the slope bottom was saved by constructing two special cars each accommodating twelve trash cans made by cutting 52-gal. steel barrels in two. The unloading on the surface at the trash heap is done by unhooking the side chains between bolster stakes, sliding the cans off and dumping each individually at the exact spot desired. As compared to the old method of unloading as a heap from the bottom of the car, this new method is easier, quicker and safer. Formerly a lot of the trash, including short pieces of wire and other things dangerous to the eyes, had to be pulled out by hand because mixed trash cannot be shoveled. While one car is outside for unloading, another is underground to receive the current dirt and trash.

In the same illustration with the refuse car is still another special, labeled "Storeroom Car." It is a steel box car having two doors that hinge at the top and lock with one padlock.

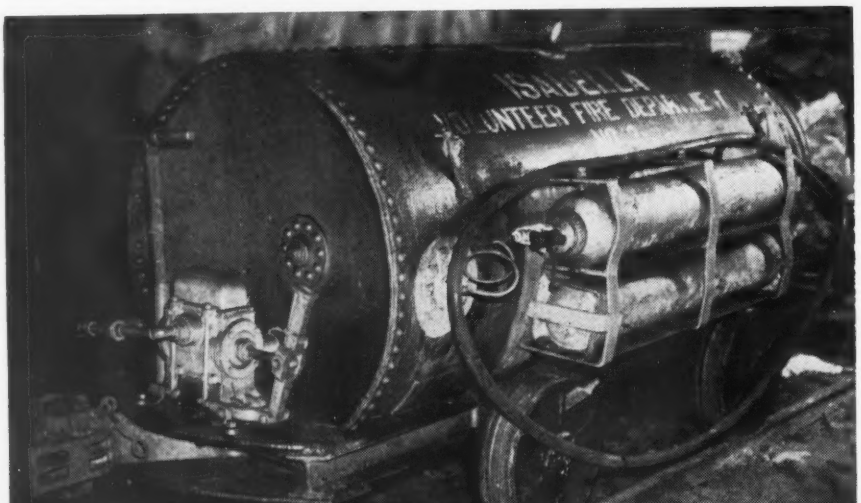


Two mechanics' locomotives in the section shop stand ready to transport repairmen, their tools and supplies when a trouble call is received.

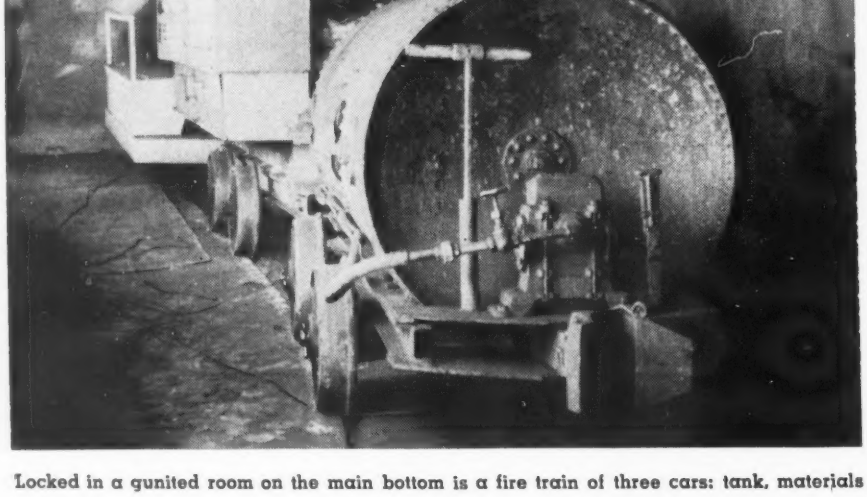


Fall crew with special car and locomotive. The latter has a cab shield to protect against the possibility of breaking wire ropes when pulling timbers.

Underground officials have the use of two "mine jeeps."



This 1,000-gal. tank of the fire-fighting fleet gets pressure from the CO_2 tanks in the rack on the side. Barely showing at the back end is a part of the 75-ft. hose, which is on a reel and already connected to the tank.



Locked in a gunited room on the main bottom is a fire train of three cars: tank, materials and man-trip.

Small parts and supplies are put in shallow steel trays which in turn are placed in the car for transportation from the outside wareroom to the supply room of the underground shop.

For underground maintenance the portable welding and cutting equipment consists of two cars: one has both arc- and gas-welding apparatus and the other has the gas only. That having both, and shown in an accompanying illustration, carries a 275-volt d.c. motor-generator (300-amp. Westinghouse Flexarc unit). Tools, torches, gas hose and welding cables are carried in locked boxes.

Cutting and welding jobs are potential fire setters, so the truck carries three portable extinguishers and an open box holding five bags of rock dust. One extinguisher is a large Foamite and the others are Lux CO_2 extinguishers especially suited to electrical fires. Thus the welding trucks, like the car built for mine scrap, serve also as fire protectors.

A crew which does Thermit welding of rails has a special low flat car with built-in locked compartments for tools and materials and with enough floor space for carrying the heater, crucibles, clamps and so on.

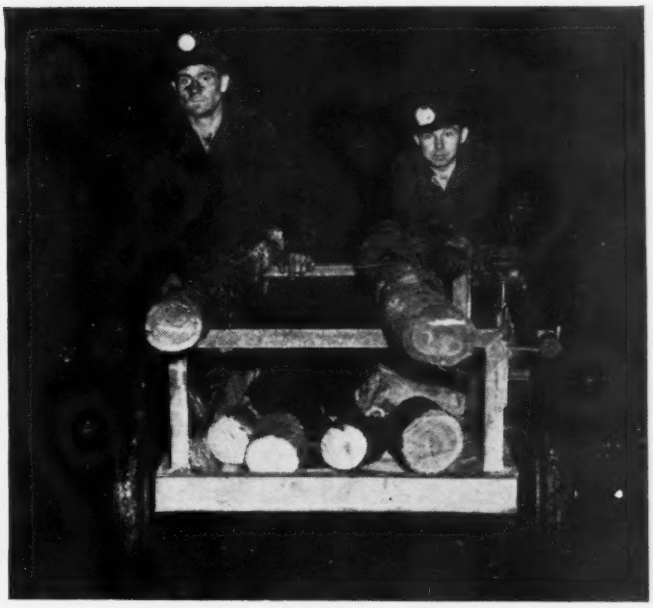
Wire Crew Uses "Jeep"

Wiremen have their own conveyance, locally termed the "wiremen's jeep," although it is primarily a 4-ton locomotive. Boxes were added along the sides to carry the supplies and tools. The crew takes care of bonding, so carries a resistance welder on top of the locomotive. In addition to this unit the wiremen have a low, flat-bottomed reel car which has brackets to support three wire reels with flanges vertical.

In this mine the section shop, termed locally the West Shop, is equipped with two pits with bridge cranes for servicing and repairing cutting and loading machines. From this shop the mechanics go out on call to make repairs in the working places or bring in machines with serious troubles. For this transportation they have two Jeffrey 8-ton trolley locomotives changed only by having low sideboards added on the trolley-wire side and one end. Tools and parts are carried on the top. The locomotives are pictured where they are normally parked in readiness in the section shop.

To recover timbering and to make falls on retreat from panels, each of three fall crews per shift is provided with a special 8-ton explosion-tested cable-reel locomotive. Each crew takes along a special flat car for carrying ropes, sheaves and a Chicago Pneumatic electric hand drill of permissible

Making one trip, a track crew comes into place with all materials and tools.



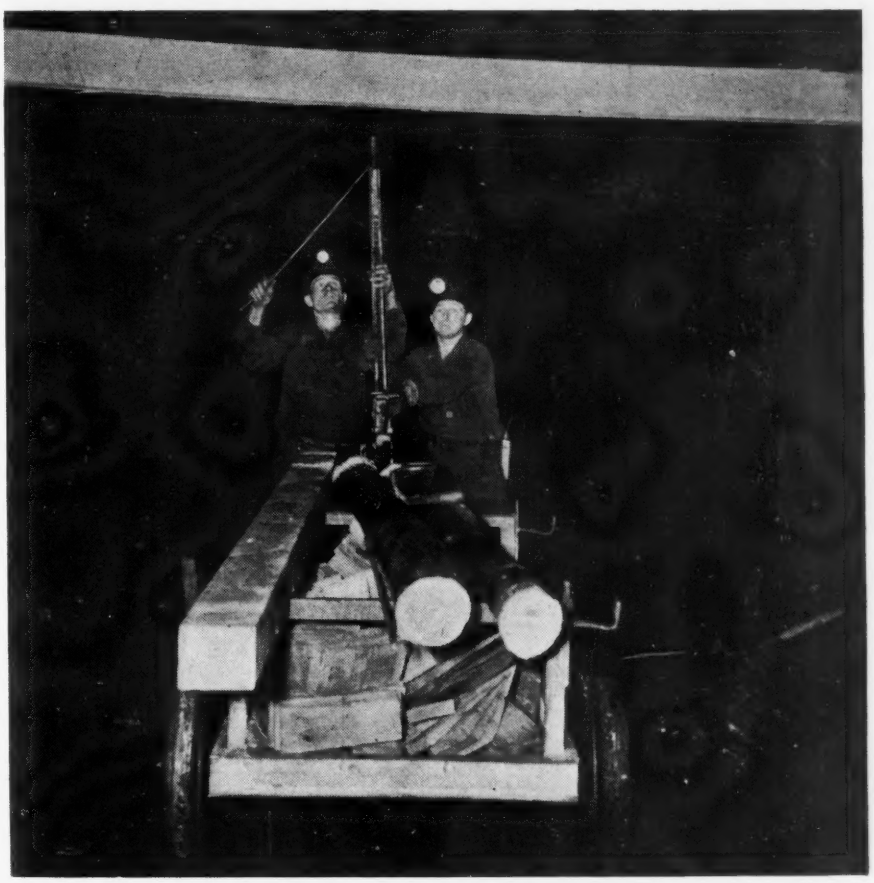
Timbermen moving into a place. The special timber jack rests on bracket hooks at the side of the standards.

type with a plug arrangement for getting power through the locomotive. The main use of this car is loading up and removing to a suitable place the various timbers recovered.

A feature of this locomotive is its steel shield $\frac{3}{16}$ in. thick protecting the motorman from ropes that might break and fly when pulling timbers. When making a pull he may duck below the top of the shield and there peep through a small slot cut at the proper angle to accommodate the eyes. Compartments and boxes are built into the locomotive to carry tools and small equipment.

Permissible air compressors are on special self-propelling cars with explosion-tested cable reels and traction equipment. The mine has two of these and another is on order from Sullivan. None of this type was on the market until recently, so the first two were built on special order. One was built by the mining company, using an Ingersoll-Rand compressor, V-belt driven by a motor from a permissible Sullivan "Ironclad" shortwall and using the cable reel from that same machine. The second unit, which has a much larger capacity so it can be used for gunite work when needed, was designed to the special requirements of the mine by Heyl & Patterson, utilizing an Ingersoll-Rand compressor, Jeffrey machine-type cable reel and other standard-type explosion-tested electrical equipment.

Experience has proved many advantages over the conventional-type compressor which has to be hauled around the mine by a separate locomotive, principally labor saving and added convenience. Total investment is much less and a unit properly built is able to shift any cars that are left in the way. One compressor is in use practically every shift to drill the numerous bottom rolls, horsebacks and heavy slate and rock falls. One man constitutes the crew.



Tightening the jack before placing the crossbar on the hoisting bracket which shows just over the top of the truck.

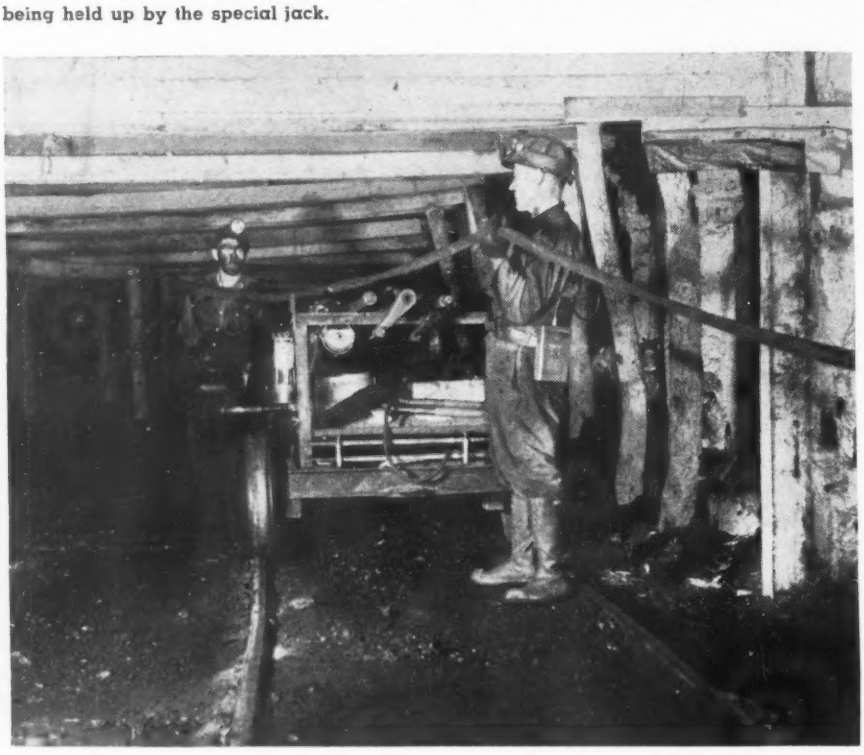
One of the most useful types of "specials" is a fleet of push trucks, of which about 60 are in daily use, saving considerable labor. Every track, timbering and drill crew in the mine has a truck on which to carry all the tools and materials needed in a place. There being on the market no complete truck of the type desired, the ones in use

were built locally, using Sanford-Day pressed-steel-wheel trucks. The bodies have fixed uprights with crossbars for carrying heavy track and timber materials, drill posts and augers. The tools generally are carried on the deck and the arrangement has proved to be convenient and practical.

Drill trucks are fitted with explosion-tested cable reels with hand cranks. Pipe rollers act as guides to keep the cable from snarling. In addition to the cable reel, the bottom deck carries the tools, tamping bags, a box of tamping sand, extra drill bits, dinner pails, etc.

Mine officials are provided with two Lee-Norse "Mine Jeeps," which in the Isabella mine are called "scooters." One is allocated to the chief electrician and the other to the mine foreman and assistant mine foreman. These lightweight trolley cars, comfortably seating five men, are driven by one small motor, series type, connected to one axle by roller chain. The scooters enable these officials to get around the large mine conveniently. A safety rule prohibits riding on locomotives.

Using the truck as a saw horse, a post is being cut to fit under the crossbar, which is being held up by the special jack.



Drillers lifting a 1/0 cutting-machine cable to get past with their truck. On the bottom deck is an explosion-tested hand-power cable reel. On top of the standards lie the drill, short and long posts and augers.

The special fleet for fighting serious fires is locked up in a gunited room on the main bottom. One unit is a tank and hose car, another a fire-tool car and the third a man-trip car. One of the illustrations shows the tank car, carrying 1,000 gal. of water, which gets pressure from two carbon-dioxide cylinders mounted on the side. Opening the valve on either of these cylinders provides pressure in the tank resulting in water spouting immediately from the hose. Both cylinders of CO_2 are kept connected to the water tank so that in case the supply in one is used up the other is ready.

Insuring Availability

Another reason for two tanks is the probability of the CO_2 freezing the water in the tank where the pipe enters. In that case the valve of the other CO_2 cylinder is opened to maintain the pressure for the short time required for the ice to melt. These two CO_2 inlets are at opposite ends of the water tank. A hand pump on the truck is intended to serve in the very remote possibility that the CO_2 pressure system fails entirely. On the truck, at the end opposite the pump, is a reel carrying 75 ft. of hose which can be quickly pulled off and always is connected to the water.

In the end-on picture of the fleet of three cars, that next behind the tank is an old mine car fitted with locked cupboards holding saws, hatchets and all tools necessary in building stoppings or erecting a brattice line. Also, this truck has loaded on it at all times a considerable quantity of brattice boards, several rolls of brattice cloth, a supply of nails and about 25 sacks of rock dust.

The third car of this fire fleet is arranged with two lockers the length of the car along each side so that it serves as a man-trip car with the men sitting on top of the lockers. Additional tools are carried in these lockers. Quick fighting of fires is assured with this complete train of three cars kept in a locked room and coupled ready for pulling.

Production per loading unit for the whole mine averages 375 to 400 tons per shift. That performance with three-shift operation maintained at this time when so many new conditions beset the mine operators speaks for the advantages of the special cars suited specifically to the jobs at hand.

ELECTRICAL SAFETY

Offers Benefits Through Reducing Injuries

More Electrical Equipment at Face and Heavier Loads Increase Hazards—Proper Safety Measures and an Electrical Code Will Keep Injuries to Minimum—Mining Men Can Aid Manufacturers

By ***PAUL M. BARLOW****
St. Albans, W. Va.

HARNESSED ELECTRICITY is one of the most universal tools of man. It is flexible, practical and so common that it is now accepted as necessary to our everyday life. Electricity, in one form or another, exists everywhere about us, but in our discussion of electrical safety underground we are interested primarily in this harnessed electricity. Static electricity and stray currents are of importance in electrical safety, but for simplicity they are now considered here.

Electricity has been put to work in just about every chore in mining. It is so dependable in its use that most of us take it for granted, and it is inevitable that we sometimes fail to respect it. It is this lack of respect, or really misuse, of electricity that is responsible for part of the hazards underground. Actually, if more attention were paid to the proper use of electricity, many of our catastrophes and losses of men and material could be prevented. Moreover, proper attention to electrical and mechanical equipment and its use results in definitely improved coal production. It has been proved time and again that proper engineering and maintenance, lowered cost, increased production and greater electrical safety go hand in hand.

Electrical safety underground has not been what it should have been, so to better understand the problem of promoting electrical safety we should look at the record and then, after considering the means at our disposal, try to outline a suitable procedure for improving our safety record.

How serious is this question of electrical safety? In West Virginia, according to data compiled by the Department of Mines (Table I) electricity accounted for one fatality a month through electrocution alone. Then there are explosions, which are largely of electrical source. During 1943 the four explosions, the two major fires and a number of unrecorded fires were all started by electricity. However, assuming that 60 percent of the explosions are electrical in origin, approximately 256, or 7 percent, of the men were killed as a result of misuse of electricity. These data compare with national figures in which electricity is shown to be responsible for about 8 percent of the coal-mining deaths. At the rate of $3,000 compensation per man, over $11,000,000 was lost in the 12-year period covered in Table I, of which $770,000 can be charged to misuse of electricity.

Electricity in Mine Fires

No records of actual monetary loss due to destruction of coal or the cessation of production resulting from fire are available, but the material loss is very great. That the misuse of electricity is becoming an outstanding cause of mine fires can be quickly seen from the data in Table II, obtained in part from the U. S. Bureau of Mines. When closely studied this record is alarming, particularly when it is realized that along with this recorded data there are many unrecorded fires. In one month alone, the writer witnessed three small unrecorded electrical fires, each of which was a misuse of electricity. Many excuses for the neglect in handling electricity are covered by "war emergency."

What About Explosions?

Study of the records of many explosions reveals that electricity is the source of ignition in about 60 percent of the cases. Explosions are spectacular and are given a great deal of prominence. While the necessary precautions are well known to practically all mining men, they are not always observed. They know that an electrical spark or flash in the presence of an explosive mixture of gas or fine coal dust in suspension results in an explosion. If they allay the dust, dilute and properly diffuse the methane and apply reasonable controls to electricity,

Table I—West Virginia Fatality Record 1930-1941, Inclusive

Fatalities	*Percentage*	*Cause*
9	0.24	Fires
113	3.0	Electrocutions
239	6.3	Gas and dust explosions
3,776	100.0	All causes

That is to say, one man a year due to fires, one man a month due to electrocutions two men a month due to explosions, one man a day due to all causes.

Table II—Electricity in Mine Fires

Period	*Fires*	*Percent Electrical Origin*	*Source of Information*
1911–1927	59	6.8	U. S. Bur. Mimes (IC-6981)
1930–1935	140	32.8	U. S. Bur. Mimes (IC-6919)
1930–1941	14	43.0	W. Va. public records
1942	2	50.0	W. Va. public records
1943 (incomplete)	2	100.0	W. Va. public records

* Formerly electrical engineer, West Virginia Department of Mines.

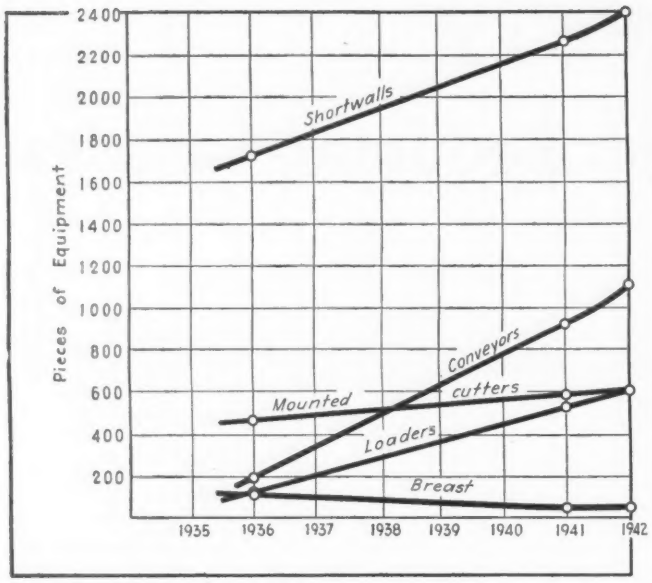


Fig. 1—Equipment trends in West Virginia mines.

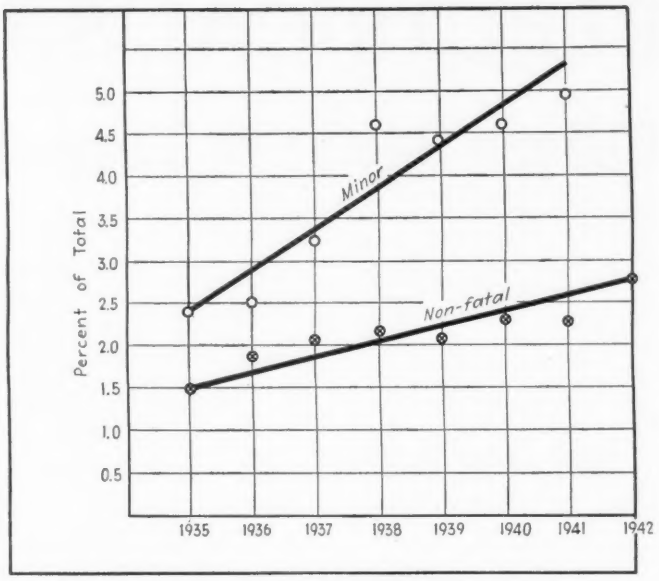


Fig. 2—Electrical accidents in West Virginia mines.

most of the explosions can be avoided.

Only one point is borne out here: i.e., a given misuse of electricity may result in a fire, an explosion, an electrocution or a minor accident, depending upon accompanying conditions.

Electrical Accidents

Electrical accidents are a true barometer of electrical conditions underground. As more electrical equipment is placed underground and as heavier electrical loads are moved to the face, electrical hazards increase. The trend of equipment in use at the face, using West Virginia data already made public, is shown by Table III and the curves in Fig. 1. These data, coupled with the figures on electrical accidents shown in Table IV and curves in Fig. 2, show the steadily increasing number of hazards in the minor and non-fatal classifications.

The fact that minor and non-fatal electrical accidents have increased steadily through the years indicates directly the urgent need for more attention to underground electrical safety. Since it is known that defective cables and wiring causes as much as 50 percent of the minor and non-fatal injuries, attention to the proper care of cables should be fully emphasized. The present emergency with its call for increased production with fewer men and less material available has placed an extra burden on an already bad cable situation. It should be remembered that fire and explosion hazards are increased as cables and wiring are neglected.

Causes of Electrocution

Electrocutions have been changing in character as complicated wiring has been advanced to the face. This is clearly shown in Table V giving data on electrocutions resulting from contact with trolley wires. Further information obtained from a study of the records is summarized as follows:

1. Electrocutions occur chiefly in hot months. During the last five years, 71 percent of the electrocutions occurred from June to October inclusive.

2. Voltages involved in electrocutions in the last five years were:

Voltage	Percent of Electrocutions
250 d.c.	68.0
500 d.c.	19.0
440 a.c.	6.5
High-tension a.c.	6.5

To make an accurate comparison of the relative hazards of 250 and 500 volts d.c. it is necessary to consider the relative man-hours of exposure to the two voltages. However, for an approximation, the "Keystone Coal Buyers' Manual, Including the Directory of Mines for 1942" was checked. This check showed that about 60 percent of the West Virginia mines operated on 250 volts d.c. and about 10 percent on 500 volts d.c. Relatively, therefore, 68 percent of the electrocutions occurred at 60 percent of the mines and 19 percent at 10 percent of the mines.

3. One electrocution occurred as a result of confusion in wire colors in a frame-grounded conveyor system at the face. This particular investigation resulted in the initiation of a color code for mining which is well on its way to becoming a national standard. An up-to-date master electrical code for mining, based on a series of such individual codes, is urgently needed. Such a code could be completely voluntary and would represent the best electrical practice and the highest form of cooperation in the industry. It need not be drudgery or another form of law to be obeyed but a living, helpful thing.

4. Many electrocutions investigated revealed that artificial respiration, while theoretically understood, was not practically applied in all cases. It should be stressed and emphasized to every man in the mines that immediate application of artificial respiration is essential. Also, the accepted mining practice of continuing respiration for only four hours should be revised. Authorities have shown that men have been revived after four to eight hours of application.

5. Contacts with trolley wire still take an unnecessary toll of lives. The obvious safety measures of proper guarding and of seating operators on the opposite side from the wire are still not observed in many cases. Also, many men have been electrocuted in motor decks. The answer here is simple: Provide ample deck room and complete the deck insulation. The use of a rubber mat on the seat and on the floor is only part of the job. The deck should be streamlined and insulating material used throughout for a 100 percent job.

6. Frame grounding is recommended, but as yet there is much confusion as to the proper method or methods. Because of the critical shortage of copper, complete frame grounding underground, in many instances, is being postponed until after the war. Lack of proper frame grounding has been the cause of many accidents on the surface, particularly around tipples.

Table III—Reported Mining Equipment in West Virginia*

	Type Machine					Percent Coal Production	
Year	Shortwalls	Mounted Cutters	Breast	Conveyors	Loaders	Conveyors	Loaders
1936	1730	476	110	197	125	2.0	5.4
1941	2271	588	47	928	532	13.6	28.6
1942	2411	601	47	1109	600	15.0	32.1

* See also Fig. 1.

Table IV—Electrical Accidents in West Virginia*

(Expressed in Percent of Total Accidents)

	Minor		Non-Fatal		Fatal	
Year	Number	Percent	Number	Percent	Number	Percent
1935	87	2.40	171	1.48	18	5.79
1936	65	2.51	257	1.87	11	3.26
1937	86	3.27	304	2.04	26	7.09
1938	146	4.60	199	2.16	14	5.86
1939	187	4.40	192	2.08	14	5.27
1940	237	4.59	247	2.30	9	2.39
1941	352	4.96	257	2.27	13	4.48
1942	(No Record)		339	2.78	12	3.15

* See also Fig. 2.

Table V—Causes of Electrocutions in West Virginia Mines

	Trolley Wire		Other Causes	
Year	Number of Contacts	Percentage of Electrocutions	Number of Contacts	Percentage of Electrocutions
1938	14	100	None	0
1939	12	86	2	14
1940	6	67	3	33
1941	8	62	5	38
1942	7	58	5	42
Total	47	..	15	..
Average	..	76	..	24

The story is not the same here because of the small quantity of material and the ease with which the job can be done. It is an economical safety measure to ground tipple motors.

What Can Be Done?

The answer to the problem lies chiefly in focusing the brain-power of the industry on various phases of its electrical hazards. The need for establishing a mining electrical code could form the basis for such a movement. An electrical code that represents the ultimate in safety practice is urgently needed. Such a code originating from within the industry would be followed voluntarily rather than looked upon as a dead listing of rules to be obeyed.

There are many associations, institutes and other groups that have the man-power and talent to work out their own codes. As a possibility, each group could submit its views or even a tentative code on a given topic to a national committee made up of representatives of manufacturers, mining operations, safety groups, governmental agencies and professional engineers. There is a wealth of information available which needs only correlation and simplification. An active national committee would do this as a matter of course.

Electrical and mechanical equipment in coal mines is going through a transitional period. Many new pieces of equipment, especially conveyors and controls, develop troubles when put underground. These all affect human safety. Manufacturers want to make a suitable and marketable product; operators want equipment that is practical, safe and economical; engineers want efficiency, which implies safety and economy; and governmental agencies desire safety above all else. All are working toward the same end, and there will be no conflict if each party will try to understand and recognize the problems of the others.

The use of alternating current for coal mining provides wonderful opportunities for saving power and reducing maintenance cost and at the same time affording a steadier voltage supply at the face. From many angles, a.c. equipment is much safer than d.c.

Mine substations always should be advanced with the mine load, as a good face voltage makes for efficiency and is definitely safer for the workers.

Fusing of equipment is receiving a black eye largely because overload protection is greatly misunderstood and, as a consequence, misused. Fuses are not a cure-all. They have only one major function—short-circuit protection. When employed for thermal or low voltage protection they are misused. An educational program in the use of fuses is urgently needed. Circuit breakers are very practical and are the answer in many cases.

Electricity Must Be Watched

Summarizing, electricity underground reaches into every phase of operation and is so common and easily applied that the tendency is to misuse it. Electricity is not in first place as a cause of injuries and fatalities, but if the proportional part of fires and explosions are properly attributed to electricity, then the rate becomes higher. The nature of mechanized mining calls for more complicated wiring and heavier loads closer to the face. This trend is changing the type of electrical accident and the source of trouble frequently can best be found only by an electrical man. The rate of increase of minor and non-fatal electrical injuries should be watched.

Electrical investigations by a competent mining-electrical engineer should be made after each explosion, fire or electrocution and after as many minor accidents as possible. Complete records should be kept on standardized forms. Many investigations made in the past have omitted seemingly unimportant information which, if listed, might have contained the key to the accident.

Manufacturers play an increasingly important role in the program of electrical safety underground. Their equipment is designed to the best of their knowledge to do an efficient job in a safe manner. They introduce new designs and materials in their products as they become known. Mining men can aid the manufacturers by advising them of the good and bad features found in connection with the use of their equipment, both old and new.

The development of an electrical code for mining is urgently needed, but the answer to the problem as a whole cannot be quickly and simply given. The development of an electrical mining code provides a medium for concerted step-by-step action on the problem on a national scale.

CUTTING COSTS
By Good Mechanical-Mining Track Plans

Shortening Changing Distance Can Save Five to Ten Times the Cost of the Switches Required—Pick-up or Spur-Track Plans Offer Best Possibilities—Conveyor Plans Should Insure Quick Trip Changing

Coal Age
CONTRIBUTION TO
LOWER MINING COSTS

HOW A LITTLE MONEY spent in the right place will be returned many-fold is no better exemplified than in track layouts for mining with loading machines. Saving from five to ten times the cost of the extra switches to reduce changing distance is possible with no departure from well-established principles. A short change, one of the easiest of all things to provide in mechanical mining, ranks with car size as a major means of cutting cost and increasing output—both vital in present operations and in the future.

While not as great a factor under many conditions, correct track layouts also can materially improve performance in conveyor mining. Where conveyors are employed, the track layout for the final transfer of the coal into cars should assure, if possible, no interruption of conveyor operation during loading. While 100-percent prevention of interference usually is not attainable, the correct track layout for car and trip changing nevertheless can keep interruptions to loading at a minimum.

One common method of reducing changing distance with loading machines — the "pick-up" system — is shown diagrammatically in Fig. 1. The branch tracks provide ample space for storing the four or five cars which a

TRACK LAYOUTS FOR SAVING UP TO 5 to 10c.

Room depth, ft.	300
Tons per cut	30
Cuts per room	50
Total tonnage from territory, including crosscuts	18,000
Car capacity, tons	3
Average trip speed (3½ m.p.h.), f.p.m.	300

	Changing on Entry	Changing at Pick-up
Average changing distance to switch over room life, ft.	300	150
Average changing time per car, minutes	1	½
Places loaded out	10	10
Cars loaded	100	100
Changing time (no change for last car in each place), minutes	90	45
Loading and other time, minutes	330	330
Total time, minutes	420	375
Time available for additional loading by changing at pick-up in 7-hr. shift, minutes	.....	45
Additional possible production under pick-up system (allowing for moving time), tons	.....	50
Production per shift, tons	300	350
Number men in crew	15	15
Crew wages per shift (depending on rates)	$140	$140
Wage cost per ton on parting	46.7c.	40.0c.
Gross saving on production from territory	.....	$1,206.00
Gross saving per ton	.....	6.7c.
Cost of four extra switches and track connections, including moving switches in and out and depreciation, assuming extra labor required		$125.00
Net saving		$1,081.00
Net saving per ton		6.0c.

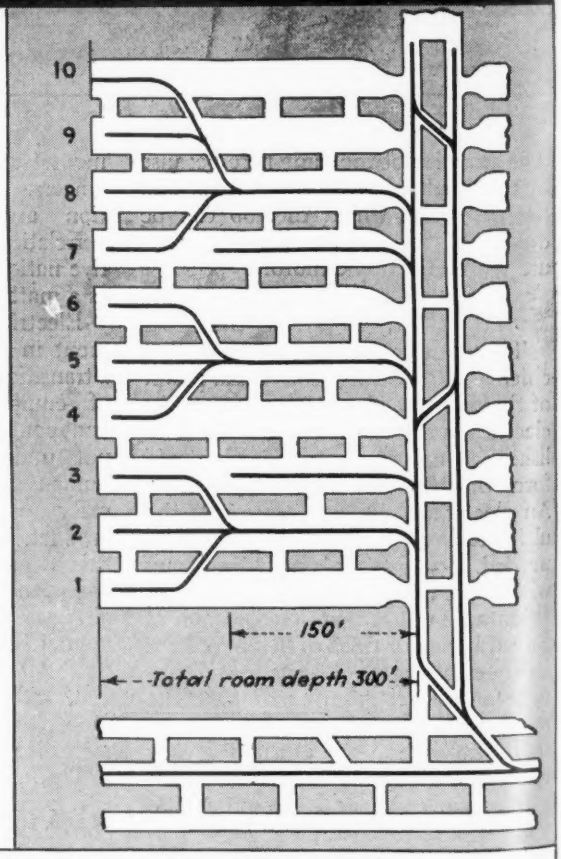


Fig. 1—Pick-up track layouts offer real savings—a net of 6.0c. per ton in this particular example.

locomotive normally takes with it in serving a loading machine. In fact, the three or four branches permit handling enough cars to clean up a place under most conditions.

What happens when the pick-up system is put into effect? How it works out under one assumed set of conditions, fairly typical of a number of operations, is shown in the tabulation accompanying Fig. 1. The result in this example, assuming that auxiliary equipment has the capacity to prepare the extra tonnage loaded and that no additional men are required, is a saving of 6.0c. per ton of coal delivered to the relay or main-line locomotive. Putting it another way, the gross saving over the life of the territory is $1,206, or 6.7c. per ton. From this, of course, must be subtracted the material cost of the extra switches and the labor of moving them into the section, laying them, connecting up the tracks and then taking the switches up again when the section is completed, amounting, in this example, to 0.7c. per ton.

Labor, in fact, is the major item in the cost of laying a switch, and for that reason the steel-tie switch, whether with steel ties or in sections with ties and other parts permanently riveted or welded together, is the logical choice. Recent quotations for 40-lb. switches with separate steel ties ranged from $70 to $80 each; sectionalized type with parts permanently assembled, $100 to $120. Figures on the number of times these switches can be laid before they are worn out range from 14 to 20 for the type with separate steel ties and 10 to 14 for the sectionalized type.

Switchlaying Cost

On the basis of these figures, a switch depreciates $5 to $12 each time it is laid, depending upon type and conditions of service. In the example illustrated in Fig. 1, using a rate of $7.50, the depreciation involved in laying the four extra pick-up switches would be $30. Laying an individual switch and connecting up the tracks probably could be done easily, on the average, by two men in a shift—probably less. In many cases, extra labor would not be needed, but if it were and if the rate for the two men was $15 per day, labor cost in laying the four extra switches would be $60. Estimating another $25 for moving the switches would bring the total cost of the four up to $125, or 0.7c. per ton on the 18,000 tons from the section illustrated in Fig. 1. In many cases the cost should be much less, but in this particular example, with generous allowances, the net saving through the use of the pick-up system is 6.0c. per ton.

It should be emphasized at this point, of course, that the estimates and assumptions used in working out this example do not infer that similar savings can be achieved at every property. In some cases they may be less; in others more, depending upon conditions, possible increases in production and costs of materials and labor. But in almost all cases, the prospects of reducing cost are substantial and careful study should be given as to how they might be realized.

In working out the preceding example based on Fig. 1, it has been assumed that no extra men need be added to the crew to make possible the increased production provided by the pick-up system. If one more man were necessary, however, the saving still would be substantial, running to a net of 3.7c. per ton, more or less, depending upon the wage rates; two men, 1.4c. per ton.

A second method of reducing changing distance, widely used in mines where pillars are taken, is the spur-track system illustrated in Fig. 2. Depending upon room centers, such spurs normally can be made to accommodate at least three to four cars, which, with the one left on the locomotive, counts

PER TON WITH LOADING MACHINES

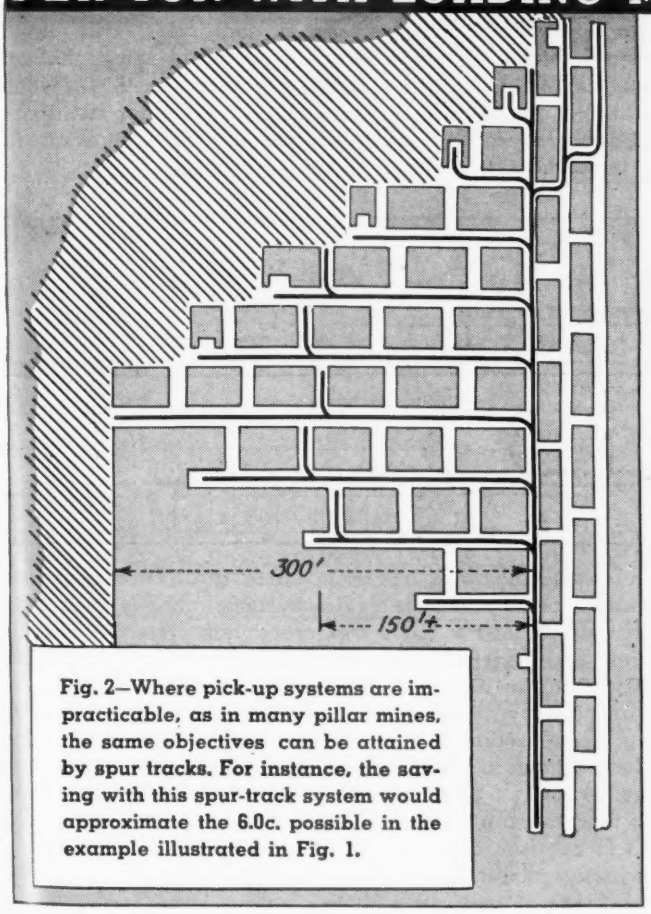


Fig. 2—Where pick-up systems are impracticable, as in many pillar mines, the same objectives can be attained by spur tracks. For instance, the saving with this spur-track system would approximate the 6.0c. possible in the example illustrated in Fig. 1.

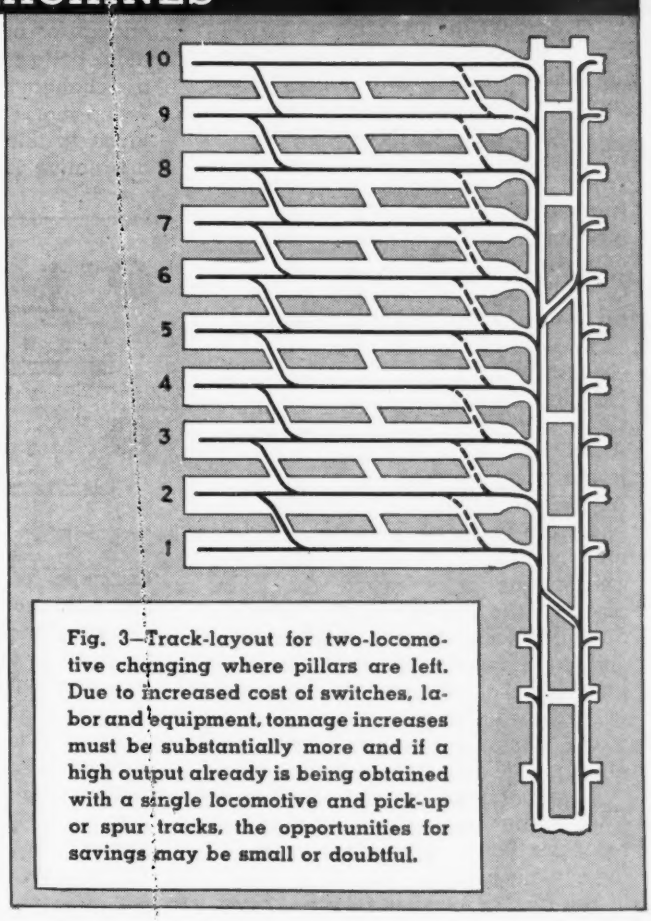


Fig. 3—Track-layout for two-locomotive changing where pillars are left. Due to increased cost of switches, labor and equipment, tonnage increases must be substantially more and if a high output already is being obtained with a single locomotive and pick-up or spur tracks, the opportunities for savings may be small or doubtful.

up to the four or five usually handled at a time in loading-machine service. The spurs, of course, serve both in advancing the room and mining the pillars.

Some mines put a spur in every crosscut, which, of course, increases the switch-laying cost, although it may be just as profitable if enough extra tonnage is secured from the loading unit per shift. But even if only one spur is installed per place, half way up, one switch is necessary in each place. As compared with the room mining plan shown in Fig. 1, however, this need not mean more switches per ton of output, since the pillar coal also comes over these switches, and if it should be twice or more the total of the room and crosscut coal, the tonnage per changing switch is no less and may be more than in room mining with the pick-up system. Thus, although a changing switch must be laid in each place, the saving through reduced changing distance should be approximately the same under either of the systems shown in Figs. 1 and 2.

Using Two Locomotives

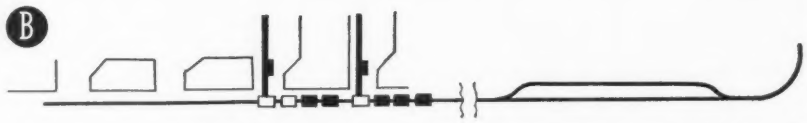
Two-locomotive changing behind loading machines is employed to increase output per loading unit at a number of mines working rooms and leaving pillars. It, of course, requires an extra locomotive and at least one extra man on the crew—a motorman. But if the addition of this motorman and locomotive results in a production increase which more than offsets the extra labor and any other costs which may be involved, such as additional switch and tracklaying, the expenditure naturally is worth while. If a high production, however, can be obtained with single-locomotive changing, the cost advantage may be small or doubtful in many cases, although not always.

Two-locomotive changing normally requires laying a switch in each place at the first crosscut and then an additional switch in each place half way or so up. One example of how the track layout might appear is shown in Fig. 3. As compared with the pick-up system illustrated in Fig. 1, six extra switches must be laid to serve three places, against one extra switch for three places in the pick-up system. This requirement, plus the extra haulage labor and equipment which must be employed, make it necessary that the tonnage increase be substantial. But, as stated, it may be profitable if the necessary tonnage increase can be secured.

Conveyor mining differs materially from mining with loading machines, but nevertheless the question of keeping cars on hand for loading as much of the time as possible is just as vital.

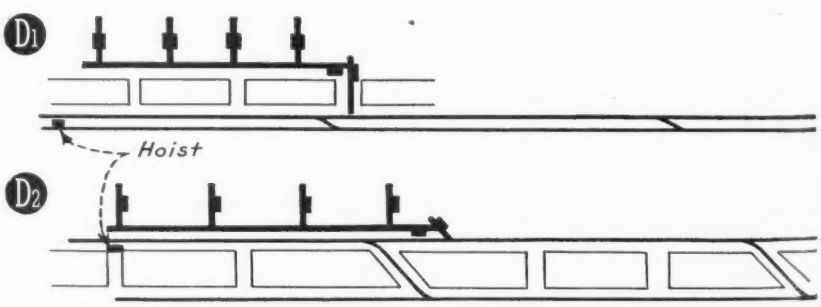
HOW TO LAY OUT TRACKS

Sidetrack at mouth of entry for trip changing. The one conveyor can be supplied with enough cars so that trips can be changed while other work than loading is being done.



Two conveyors, individual discharges, gravity car movement. Trip split between conveyors with more to the one upgrade so that an empty can be dropped through to downgrade unit if upgrade unit cleans up first. Care necessary to arrange loading and trip changing to prevent interruptions to loading. Tail track is protected by leaving in stumps, which may be recovered, with the chain pillars, by laying back one or more conveyors.

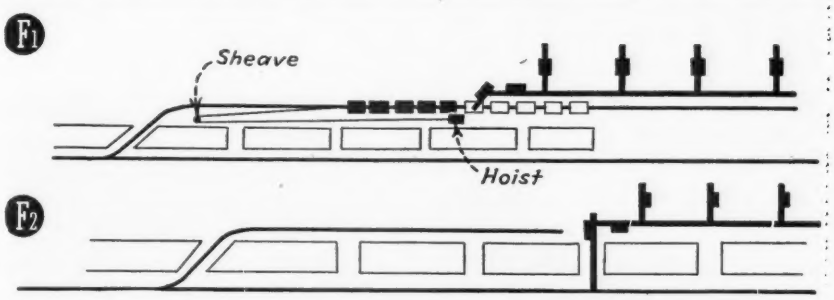
Same principle as illustrated in *B*, except sidetracks are moved up to conveyor discharges. Trips may move in either direction for loading if room for tail track is provided. New sidetrack normally must be constructed each time. Sidetrack may be placed in same heading if wide enough or in parallel heading. In either case, if coal is low, will require more bottom lifting or brushing than sidetrack at mouth of entry, although trip-changing time is reduced. While double-tracking, as in *D*, would tie up more material, it might be more economical from labor standpoint to go to this construction rather than move and rebuild sidetracks. An alternative is to build the sidetracks as the entry is driven.



Examples of double-tracking with tracks in same or in two headings. Probably most flexible of all conveyor-service systems, although requiring more material. If hoist is used to move trip, crossovers preferably should be close to loading points so that when loaded trips are pulled out hoist rope can be pulled back to new trip unless other means are employed. Use of the gathering conveyors illustrated brings all coal from the several conveyors to one point, reducing car-trimming labor. They also can reduce loading interruptions if trip changes are made quickly. Slow trip change can increase loss of output, however, since it might shut down loading on up to four or more conveyors at once. By re-laying gathering conveyor to feed in opposite direction, same loading point and facilities can be used in working next outby group of rooms.

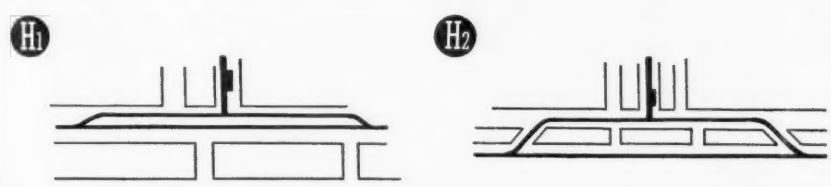
FOR CONVEYOR SERVICE

Sidetrack outby or double track to conveyor discharge. Both systems provide a changing point close to loading point.

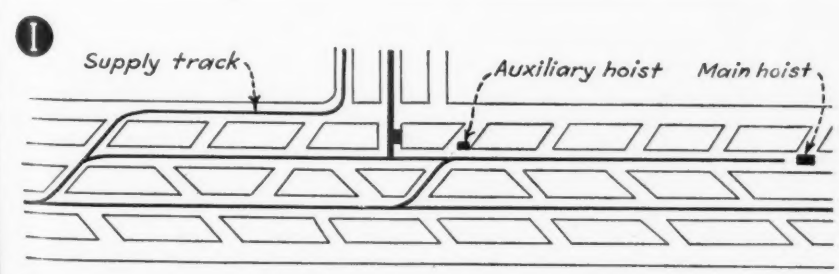


Examples of spur tracks which, in effect, are sidetracks with only one entrance. Brings trip-changing point close to loading point. Hoist may be set at loading point with sheave outby for necessary change in rope direction. By hooking rope on empty trip as it is pushed in, rope can be pulled back ready for moving new trip. Tail track as long as gathering conveyor provides ample storage. As in *D*, gathering conveyors may be re-laid to work outby rooms.

Loop-track systems, susceptible to a number of modifications. Closing the loop (G-2) provides an opportunity for close trip-changing.



Sidetrack systems for trip service to mother belts.



One of the better trip-changing systems for mother-belt service. In this example, an auxiliary hoist is installed to move empty trip and save time while loaded trip is pulled out through crossover near loading station, bringing the rope from the main hoist back with it. As an alternative, one or more cars may be dropped through for loading by gravity if grade permits.

If the time required for changing a trip of cars is lengthy, the loss of tonnage may be equally serious. This statement is made with due recognition of the fact that while conveyors are stopped, crews may engage in other work. However, there always is the chance that undue stoppages may leave some men relatively or completely idle, not to mention the disruptive effects of trying to perform work out of the normal place in the cycle. Changing trips with a minimum or no loss of time reduces the chances of interruption of loading, and the fewer the interruptions the fewer the disturbances in the normal face cycle, with consequent increase in efficiency.

Close Change Helps

With one or two conveyors per entry, the pressure for a quick trip change is reduced, but not entirely eliminated. Consequently, it may be feasible under such circumstances to put changing sidetracks at the mouth of the entry. But as the number of conveyors per entry increases, normally meaning that a gathering or mother-belt conveyor is installed, the changing point normally must be put as close as possible to the loading point, with the ideal an arrangement whereby an empty trip is coupled to the trip at the conveyor while a trip of loads is taken off the other end.

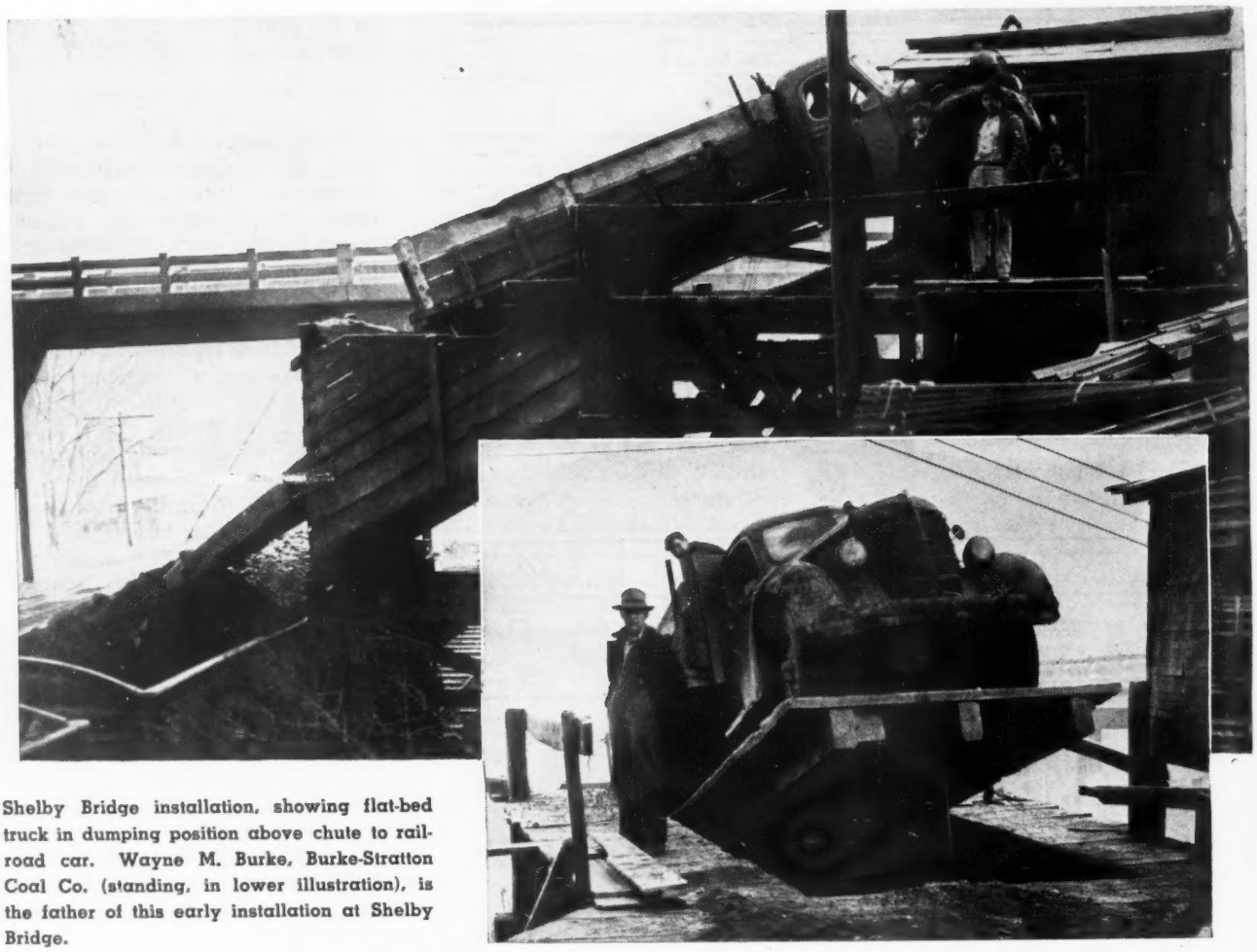
Such an ideal situation is difficult to obtain in practice, but a close approximation is shown in the final example in the following list of specimen track plans for conveyor mining. These plans, incidentally, are subject to a number of modifications without altering their basic principles. But in the example in question, for mother-belt service, an auxiliary hoist is provided to move the new empty trip while the old one is being pulled out, at the same time bringing the rope from the main hoist back for attachment to the empties. Thus maximum opportunity for loading is assured by reducing the time of changing trips.

As the number of conveyors feeding to a common loading point increases so does, normally, the need for a positive method of controlling trip movement. Therefore, a trip-pulling hoist or retarder almost always is a paying investment where the tonnage to a loading point is large and often when as few as one or two conveyors are involved. The positive control thus provided makes for smoother, faster and more continuous loading and greater safety. Such hoists or retarders are easily supplemented with remote-control facilities so that they may be placed at any desired point away from the loading station.

NEW DUMPING METHOD

Utilizes Flat-Bed Instead of Dump Trucks

Use of Cheaper, Higher Capacity Flat-Bed Trucks Made Possible by New Dumping Plan—Platform Built on Parts for Mine-Car Kick-Back Dumps—Lower Maintenance Another Advantage



Shelby Bridge installation, showing flat-bed truck in dumping position above chute to railroad car. Wayne M. Burke, Burke-Stratton Coal Co. (standing, in lower illustration), is the father of this early installation at Shelby Bridge.

COST of trucking coal to ramps that load to railroad cars has been reduced by some operators at Pikeville, Ky., through the happy circumstance of a war substitute proving better than the original. Most of the truck mines in that vicinity are war babies that started too late to obtain enough new or used dump trucks to go around. Ordinary flat-bed trucks were available, so the obvious solution was to find some way to unload that type without labor. Mine cars have "always" been dumped by tipping them endwise or turning them, so why not tip the whole motor truck? That is what is being done. A wooden driveway platform with a wheel bumper block at one end is supported on an axle so that the whole platform, with the truck standing on it, tips about 30 deg. from horizontal, or enough so that the coal will slide out the back end of the truck. That amount of tipping causes no trouble from leakage of liquids from gas tank, battery or crankcase.

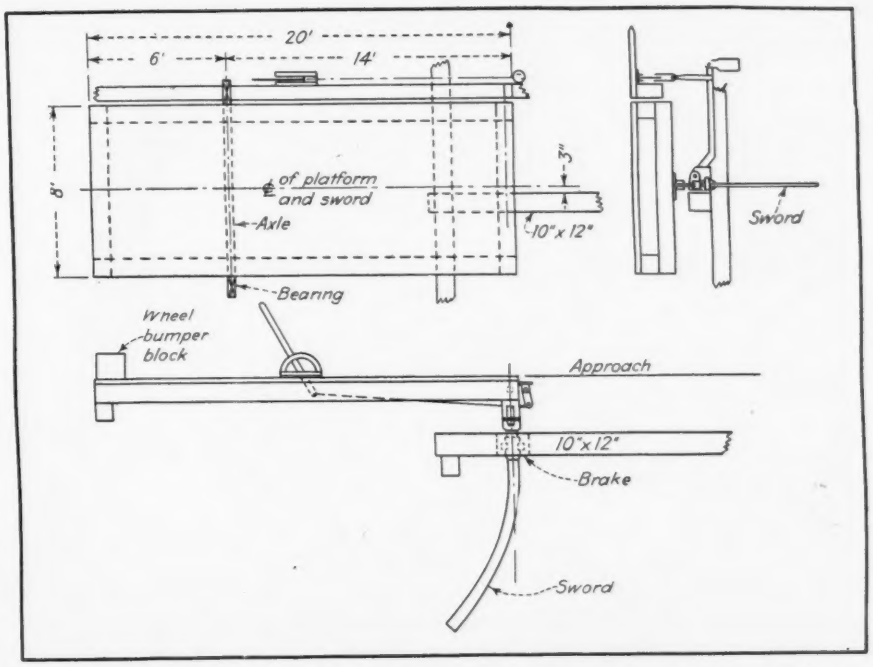
For the most part, 1½-ton trucks are used and when equipped with dump bodies their load limit is about 5 tons. With the same chassis but with a flat-bed body, 6½ to 7 tons can be hauled because of the lower center of gravity. Practically all of the coal comes over sections of bad, unpaved road. Besides being more readily available, the flat-bed truck costs $300 to $400 less than the dump type. Maintenance of the hoist is an added expense with dump trucks. Locally it costs only about $100 to have a carpenter build a 12-ft. flat wooden bed on a chassis.

The tipping platform of the Burke-Stratton Coal Co.'s dump, installed in June, 1943, at Shelby Bridge, the first tipping type in the Pikeville vicinity

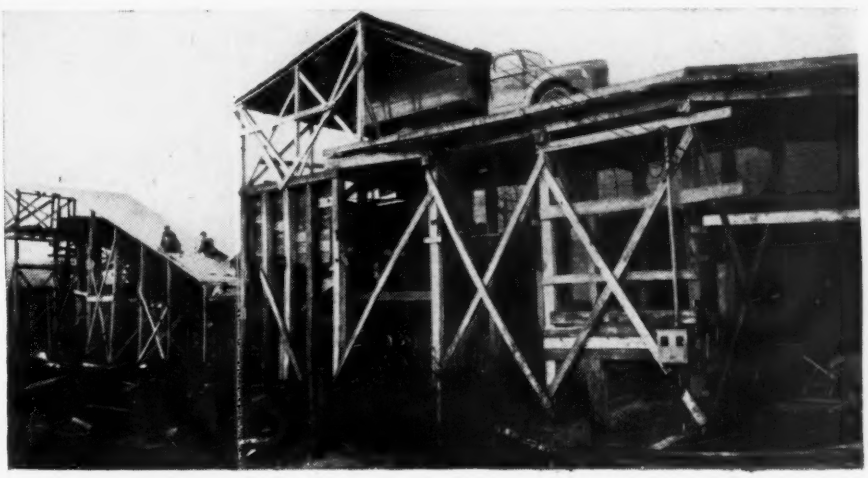
and shown in one of the illustrations, is 8x20 ft. and the axle is 6 ft. from the back end. With this balance, the weight of the coal tips the dump; then, after the coal is out, the front end of the truck is the heavier and the platform tips back by gravity to horizontal. Standard mine-car dump parts are used, and the Phillips Mine & Mill Supply Co. has already sold new outfits consisting of axle, bearings, sword, brake and control levers for this truck-dumping service.

Within the city limits of Pikeville 3,300 tons or more of truck-mine coal is being shipped per day from ramp loading stations. One of these, owned by the Big Sandy-Elkhorn Collieries, uses the same type of dumping platform but discharging to a ground-level bin. From here the coal is elevated by a 36-in. belt conveyor 57 ft. long (centers distance) to a chute leading at right angles to the railroad car. An electric hoist is installed for spotting cars on the sidetrack, which is practically level.

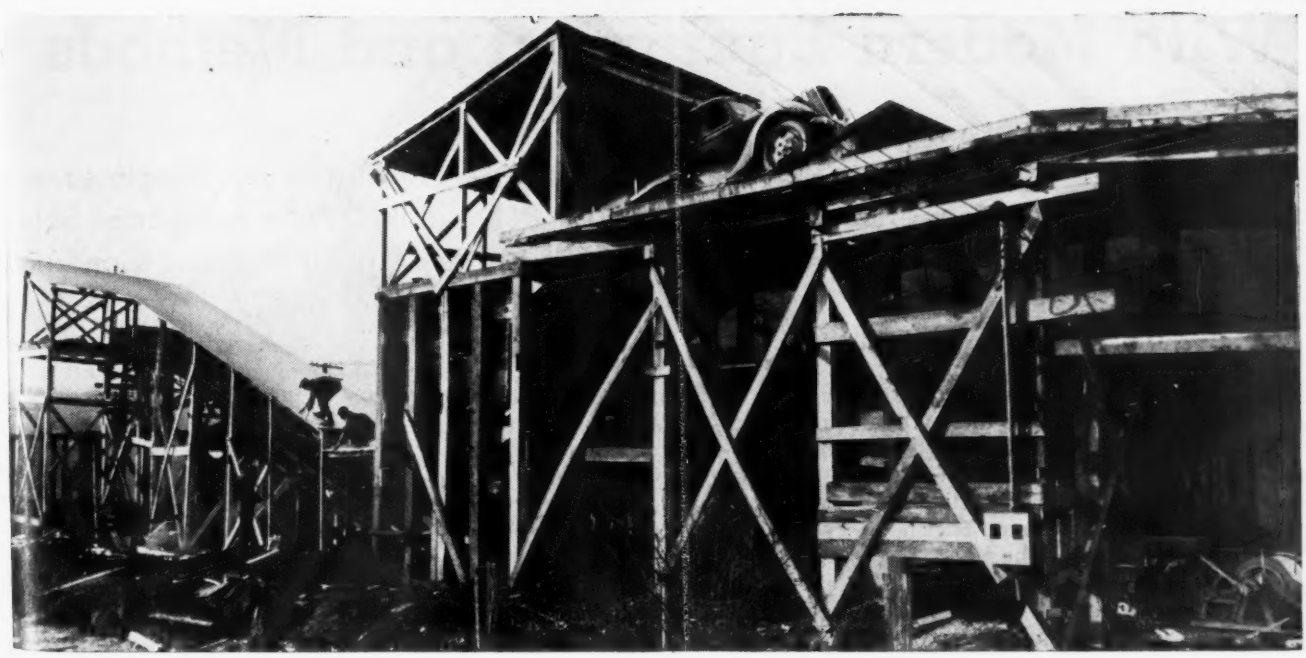
Unofficial figures place the truck tonnage for Pike County at 1,285,902 for the year 1943. Practically all of this was shipped out of the valley by rail and most of it went to the steel companies.



Preliminary layout of truck-dumping platform for flat-bed trucks. Weight of the coal tips the truck to dump and it returns to horizontal by gravity.



This flat-bed truck at the ramp station of the Big Sandy-Elkhorn Collieries at Pikeville rests on a pivoted platform which tilts the truck backward to dump. At the left is a conveyor up to the loading chute. On the ground at the extreme right is an electric hoist for spotting cars.



Rider recovery with dragline, shown here in the process of lifting the coal for deposition on the bank.

LOW-COST STRIPPING

With Modern Equipment and Methods

Box-Cutting in Deeper Overburdens Facilitated by Draglines and Scrapers—Tandem Operation or Rehandling With Auxiliaries Solves Problems of Deep Cover—Draglines Best Under Certain Conditions

OPERATION of stripping equipment in normal overburden of average thickness is largely routine after the pit has been laid out, the correct method of shooting the overburden developed and the matter of positioning the stripping unit for maximum efficiency worked out. Most of the difficulties in stripping, especially with shovels, come in box-cutting or working in deep overburden.

Slip scrapers were one of the earliest stripping mediums and, paradoxically, the scraper—now many times larger and power-operated—has again established itself as a useful stripping auxiliary when not employed for the entire stripping job. Shovels, however, lead the field as stripping units, although even in the field of large units the dragline has shown substantial progress in recent years, either as the sole stripping unit or as a part of a shovel-dragline team.

The shovel holds its leading position because, where its reach is sufficient to spoil the overburden, its larger bucket and quicker swing enable it to move dirt at one-third to two-thirds the cost possible with a dragline. This is not to say, however, that the dragline always is at a disadvantage. Under many conditions, taking everything

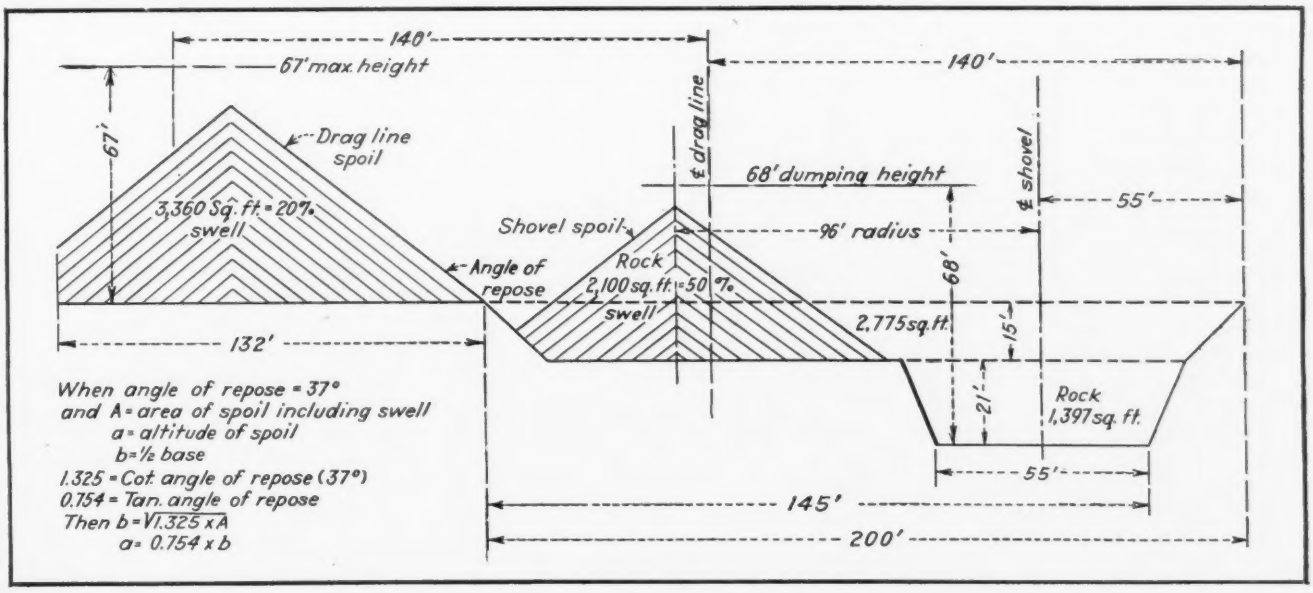


Fig. 1. An example of box-cutting with dragline assistance.

into consideration, it is the logical stripping unit. With the shovel, the caterpillar mounting and deep underframe give it the height advantage it needs. Operating on solid coal, weather and surface conditions hinder it little in traveling, although heavy grades may require special provisions to keep it level. And in addition to increased dumping heights, greater ranges are being built into some of the newer shovels. A late 20-cu.yd. machine, for example, has a dumping height of 81 ft. and a maximum range, with 133-ft. boom and 90-ft. dipper handle, of 153 ft., pivot point of shovel to center of spoil rod. Special controls and a heated cab on other features.

Increasing Shovel Efficiency

If additional dumping height and range should become generally desirable, it seems perfectly feasible to build them into new shovels, within reasonable limits, without unduly increasing cost, while perfection of a good stacker may solve the problem in another way. For the present, however, shovels seem to have hit a weight ceiling of about 1,500 tons. But better materials are being used. Perhaps the resistance of the coal to crushing may be a factor militating against any major increase in weight, even with crawlers providing a larger bearing surface. Crushing under the crawlers, in some cases, is so extensive that fines must be removed and spoil substituted to carry the shovel over. For certain conditions, the present limit of 35 cu.yd. for dippers may be increased. At least, larger dippers have been discussed.

Large shovels are commonly—and usually correctly—reputed to be less portable than draglines. Yet a number of shovels have been moved long distances overland. A recent instance was moving a 1,500-ton machine 12 miles across country in 12 days. Two streams were filled in and a main-line railroad was cut temporarily to permit passage. The move was made in dry weather. Power was derived from a portable substation shifted along the power line, from which 4,000 ft. of cable served the shovel.

Another step toward increasing the efficiency of both new and existing shovels are new control systems relying on specially designed exciters. They do five things to simplify equipment and improve shovel action: (1) build up generator voltage rapidly; (2) control shovel motions exactly; (3) simplify wiring; (4) eliminate most of the contactors; and (5) reduce maintenance. Added to these qualities, users claim gains in cycle speed justifying their use. The cost is estimated at approximately $2,000 per shovel motion. A special exciter is required in each generator. At least one builder suggests investigation before deciding to equip old shovels. One user states that all new strip shovels will be equipped.

New materials and designs also have facilitated production per unit in still another direction—more dipper capacity with no increase in shovel size and power. High-strength alloys have made it possible to raise dipper capacity 50 to 100 percent with little or no increase in total loaded weight. Thus, lighter dippers and lighter front ends have made possible much of the recent increase in output per shovel with little increase in dead weight and, in addition, have permitted substantial increases in the output of old shovels with few or no other changes.

Coal Age
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LOWER MINING COSTS

Using the Shovel Effectively

But whether a new design or rebuilt to incorporate certain modern features, the test in shovel operation is utilization of its producing capacity as close to 100 percent rating as possible. The primary requisite is a well-prepared

highwall (February *Coal Age*, p. 93). Loose, well-broken overburden increases output and materially reduces maintenance—both vital factors in the success of a stripping operation. One man puts it this way: "An idle electrician is much to be preferred to an idle stripping shovel." The way to keep a stripper at work is to have the overburden so thoroughly broken that mechanical stresses sufficient to overstrain parts or overload the electrical equipment are impossible.

Positioning the shovel with relation to bank and spoil influences performance and maintenance. Naturally, the shorter the swing, the greater the output. While there are limitations on how much swing can be reduced, a little thought to shovel position can keep this part of the cycle within efficient bounds. As a corollary, keeping the shovel at the right distance from the point of attack reduces stresses, as compared to digging with a too short or too long stick, and saves time. The trick is to balance between long stick work and additional moving time, but, if properly worked out, such balance assures maximum efficiency.

Clean-up normally is a time-consuming job for stripping shovels and should be reduced to the minimum. Consequently, the almost universal use of the tractor and bulldozer with stripping units is amply justified. One company has removed the engines from tractors and replaced them with electric motors plus motor-driven reels and powering them through cables from outlets on the shovels. Since the bulldozer always accompanies the shovels, this arrangement has been found to have several good points.

Solving the Box-Cutting Problem

Box-cutting, as stated, often presents the stripping shovel with one of its biggest problems. Frequently the easiest way out is taken, and if there is an outcrop the box-cut is made there when drainage, haulage and other considerations would warrant opening up elsewhere; perhaps in deep overburden. Location of the box-cut is, in itself, a matter deserving of considerable study and it may pay well, in many cases, to make it in deep overburden, especially when it is recalled that modern aids permit opening at low cost in thick cover.

These modern aids include the dragline and the tractor-powered scraper. Most stripping operations keep a dragline on hand for utility work if not for stripping, and a number employ both draglines and scrapers.

How one operation tackles the problem of opening a box-cut on paper before field work starts is shown in Fig. 1, including the spoil formula, based on an angle of repose of 37 deg. The surface was stripped by a dragline wide enough to provide a bench for the shovel spoil, with the dragline spoil beyond. This general method is employed by a number of operators, differing only in details as required by depth of overburden, shovel characteristics and relative proportions of rock and dirt.

Much the same method of box-cutting can be used with a scraper or scrapers supplementing the shovel. A typical example is given in Fig. 2. Normally, the scraper spoil is deposited beyond the site of the shovel spoil, which may be placed on the bench or partly on the bench or on the highwall. A further variation is putting the shovel spoil partly on the scraper spoil.

The scraper provides even greater flexibility when it is necessary to box-cut against a property line, ditch or other limit. Fig. 3 is an example. In this case a part of the spoil is pulled out to the front of the cut by the scraper and wasted in a thin layer for later rehandling in regular stripping. In completing the box-cut, the shovel spoils on the bench next to the ditch or property line. While it would necessitate rehandling the spoil for practically an entire cut, it is possible, where overburden thickness is not too great or rock interferes, to make the box-cut down to the coal with the scraper and deposit the spoil out in front. Thus, if the value of the coal should warrant, it is possible to work up to the property line.

Rehandling shovel spoil is another method of opening up a box-cut. One version, employing a small loading shovel, is shown in Fig. 4. The loader, working off a spoil platform which it builds out in front from time to time, relays material from the stripper back away from the cut, thus making it possible to deposit the entire box-cut spoil on the bank. A dragline or scraper may be used much the same way for the same purpose.

In regular stripping, the classic method of handling thick overburden areas, such as ridges, knolls and the like, is to curve the pit, thus increasing the length of the spoil row and correspondingly the space available for dumping. But there are several other schemes which can be worked either with or without rehandling a part of the material. If a dragline with sufficient reach is available, it may knock off part of the ridge or knoll and throw the spoil across the pit behind the last shovel spoil row. But auxiliary draglines with sufficient reach often are not available. An alternative is to use the scraper, either to haul the material away to a point where rehandling is unnecessary or to spread it out in a thin layer for rehandling, thus reducing the peak in spoil disposal which otherwise would occur in a relatively short distance.

Putting a shovel, dragline or scraper on the spoil pile is a good method of working through overburden peaks, although it involves the problem of getting the machine into place over the spoil and operating it on the rock and other loose material, especially when the weather is bad. The dragline or scraper normally is the best bet, although in some cases a tractor and bulldozer may be able to take care of

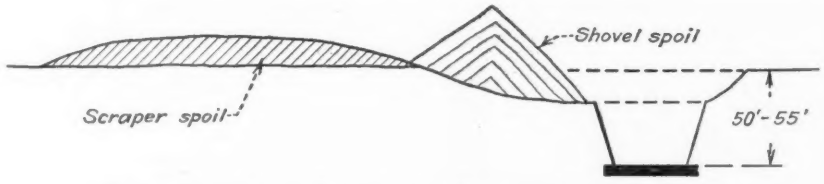


Fig. 2—Box-cutting wtih scraper spoiling part of the overburden.

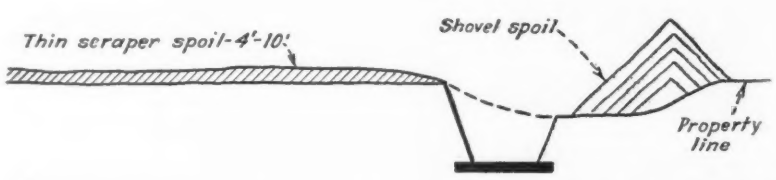


Fig. 3—Box-cutting against a barrier, using a scraper to spoil part of the material a thin layer in front of the cut for later rehandling.

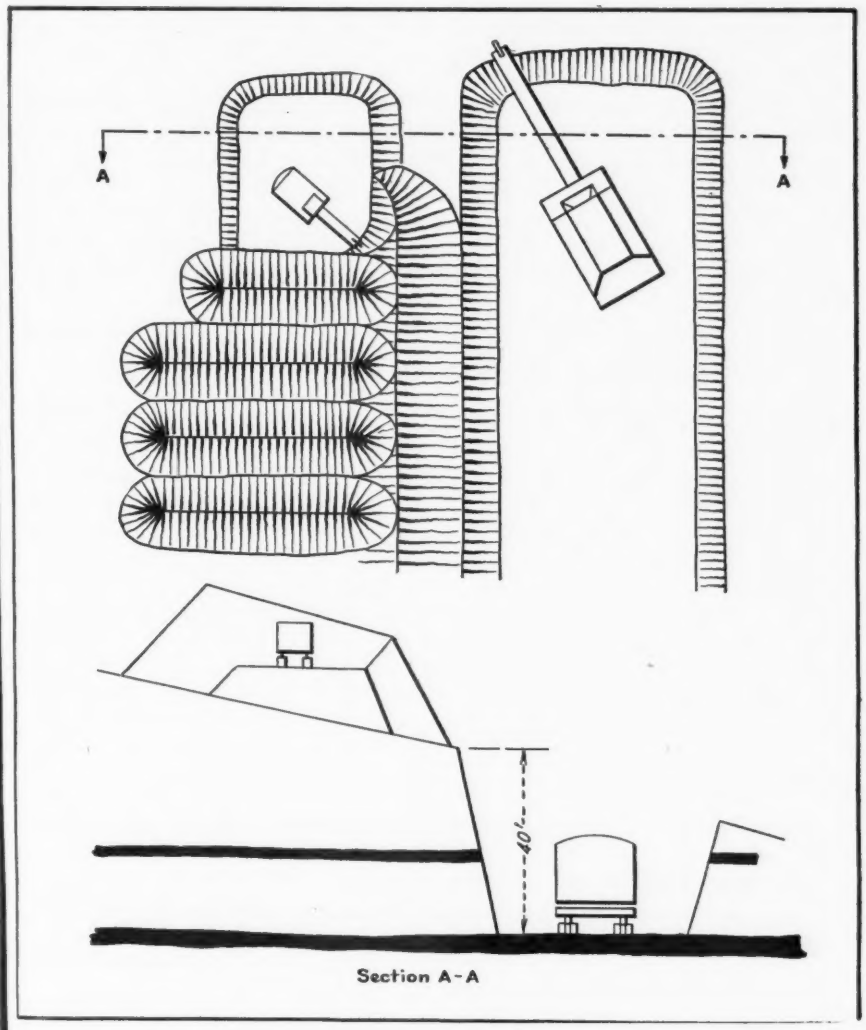


Fig. 4—Box-cutting with shovel relaying part of the spoil.

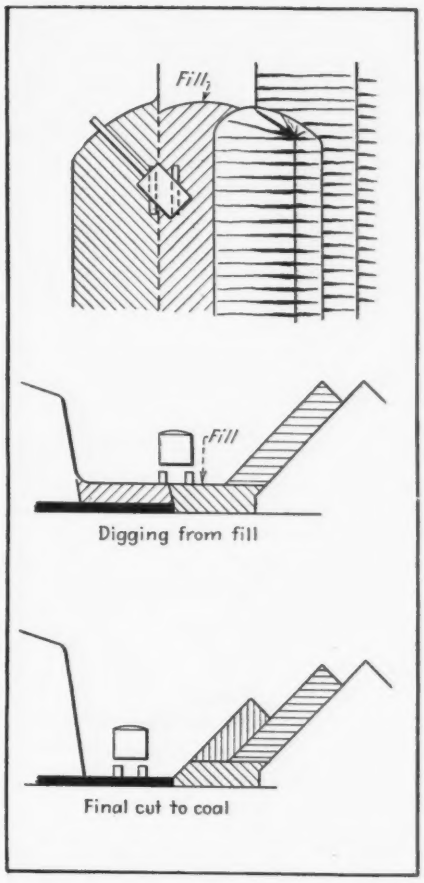


Fig. 5—Operating on fill to make possible stripping heavier overburden.

the last few cubic yards, which mean the difference between getting through cleanly and running the risk of a choke in the pit. Whatever the type of machine employed, the problem is one of mounting it on the spoil so that it can pull or push back enough of the material to let the shovel through the overburden peak. Very often even a 1½- or 2-cu.yd. dragline with a short boom, used at many pits for utility work, will have the capacity necessary to take care of the temporary excess of overburden, and if used, will permit carrying full pit width with little interference from spoil spilling or sliding down on the coal.

Where thicker-than-average overburden extends over all or a large part of the property, the two choices presently available to the operator are draglines or dragline-shovel combinations. In outcrop strippings, in addition, some operators have used a benching method to enable small 2- to 3-cu.yd. stripping shovels to handle 5 to 10 ft. more of overburden than they normally can attempt. Fig. 5 illustrates the system. In making the last cut going into the hill, as an example, the shovel fills the pit to a height of 6 ft. or so above the coal level. It then ramps up onto this fill and starts stripping, throwing the material back against the side of the old spoil row as far as possible, meanwhile digging as low in the bank below the cuts as it can. When stripping has been extended the desired distance, the shovel cuts down to the coal and removes the remainder of the overburden, throwing it on the bench from which it previously worked.

Tandem operation with shovel and dragline may be worked in two major ways. One is with the dragline in the pit following the shovel. With this plan, passing at the end of the pit can become somewhat of a problem, in addition to the fact that pit operations are complicated by the presence of an additional machine. Also, the dragline normally is forced to swing somewhat farther—often a full 180 deg. The objective, of course, is to deposit the spoil behind the row made by the shovel ahead of the dragline, as otherwise the soft dirt, if the shovel spoil were deposited on it, would make an unstable foundation with greater likelihood of slides.

With the new higher-capacity draglines, including the popular walking type with lower bearing pressures resulting from the increased bearing surface of the tub, longer booms have made it more feasible to operate the units off the bank, thus getting them out of the pit and preventing various kinds of interference. In addition to assisting the stripping shovel in ordinary tandem operation, such units also have been employed in increasing numbers for recovering rider seams. The principle of operation is substantially the same whether or not a rider is present.

Recovering Rider Seams

A set-up for rider recovery is shown diagrammatically in Fig. 6. In the dragline part of the operation a preliminary bench cut is made to get the machine down on solid material. This cut usually is made by swinging the machine around and cutting over the area the dragline will strip on its return

trip. Thus, the benching cut normally is kept one cut ahead of the main dragline cut, although, if desired, the dragline can work ahead out front instead of a cut ahead. As Fig. 6 indicates, the dragline spoil—usually dirt and other soft material—is put on top of the shovel spoil.

A variation of the above system of recovering rider coal finds the dragline also playing the role of a coal handler. Working from the bank, the dragline first strips off the soft overburden. Then it reaches back and lifts the coal, depositing it on the bank in piles. When the accumulation is sufficient, the coal is loaded into trucks and hauled to the preparation plant. This same operation also employs the "key cut," a narrow cut to the coal along the line of the new highwall. The key cut permits leaving a more nearly vertical wall and obviates dragging the bucket against the wall to get a full load and a neat wall.

A dragline operating off the highwall or a bench, according to some stripping authorities, never needs to swing 180 deg., as will a machine in the pit, and the yardage can be increased substantially. Some place it at as much as 70 to 80 percent of a shovel with a bucket of equal capacity.

Rider recovery also has been accomplished with a combination of stripping and loading shovels, as in the example in Fig. 7. In this instance, the stripper removes the overburden down to the rider. When a desired section has been loaded, the same loading shovel cuts down to the main seam and starts working backward, stripping off the interval and throwing it along the base of the stripper spoil. The final operation is loading the main seam. Where the interval must be shot, it ordinarily is drilled vertically. Where draglines are employed in rider recovery, however, it has been found in some cases that the entire bank can be broken with the usual horizontal holes without seriously disturbing the rider, which merely is lifted to settle back, especially when it is high in the bank.

Dragline Stripping Methods

Where shovels can be used, especially in the larger sizes, it usually is cheaper, as intimated earlier in this article, to employ them in stripping. This, however, by no means rules out the dragline as a primary stripping unit handling the entire job. Thickness and value of the coal, character and depth of overburden, how the coal occurs and whether stripping must be done over several separated areas influence the choice and may make the dragline the better machine, even though its output is inherently lower than the same unit equipped as a shovel.

Where the burden is well over average thickness, or is of such a nature that it has a low angle of repose, as examples, the longer reach and other characteristics of the dragline may make it the cheapest stripping unit in the long run, especially if otherwise two stripping units would be necessary. Its ability to move quickly makes it advantageous where several stripping areas must be worked. And if the coal is pitching, as in the anthracite region, the dragline makes it possible to operate by casting, work deeper down the pitch at a lower cost, and, in many instances, to recover the coal without the necessity of any men or equipment entering the pit.

Summing up, the dragline, like other types of stripping units, has a field of service in which it dominates, in addi-

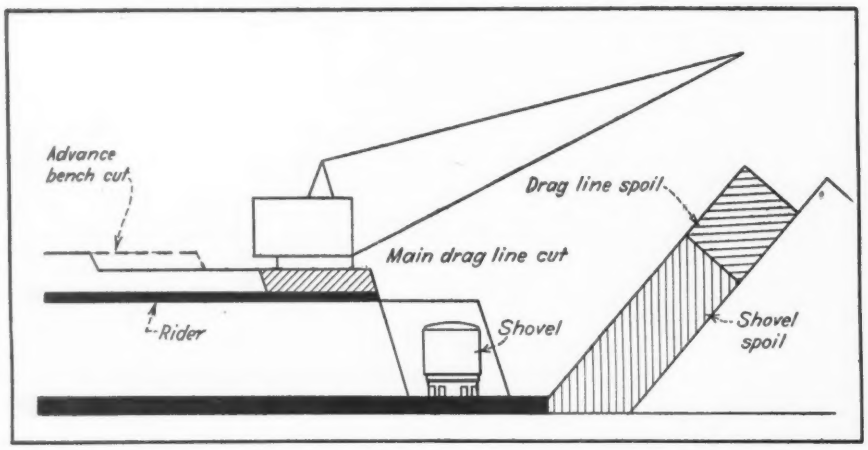


Fig. 6—Rider recovery with dragline. Main seam stripped by shovel.

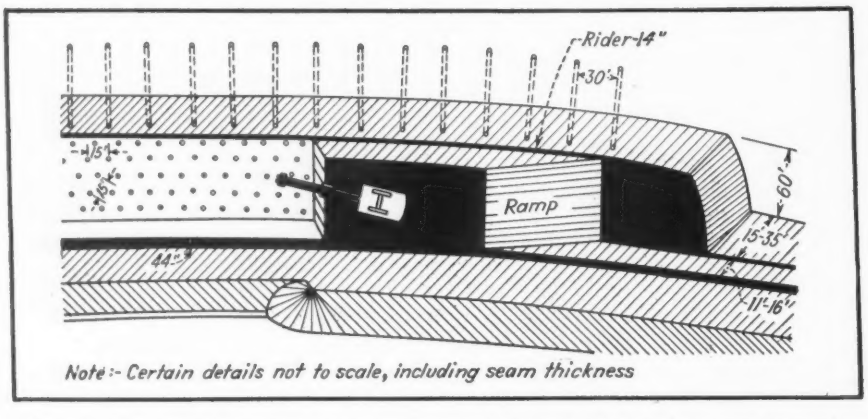
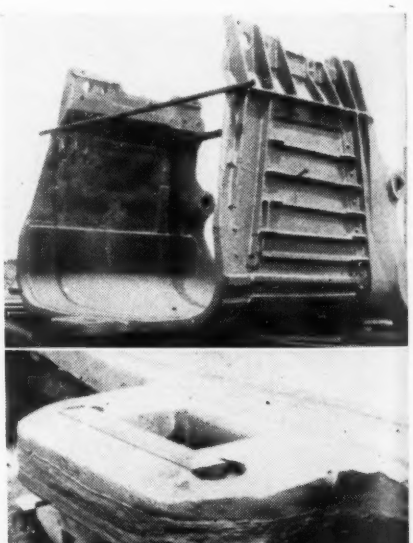


Fig. 7—Two-seam recovery using small shovel to load rider and remove interval.



Rebuilt 30-cu. yd. dipper, using old rear-end casting and new lip. The ribbed section was built and the dipper assembled in the mine shop. The inset shows the renewal tool-steel latch face and extent of wear replaced by welding. The lower part of the body is double thickness. Holes were burned through the inner sheets in the bottom and the inner and outer sheets were welded together through these holes to complete the job.

Disposal of Government Inventories

How to dispose of government surpluses when the war ends need not be an insuperable problem—if we face it promptly and intelligently. But if we do not, peacetime markets may be disrupted, government funds wasted, production discouraged, and reconversion of the whole economy to peace seriously hampered.

What we need most in order to attack the problem is estimates of how much surplus there will be, in what types of goods, and where.

At the war's end, government inventory of war goods is likely to total around 60 billion dollars. Most of this will consist of aircraft, ships, and other ordnance. Only some 15 billion dollars or less will be in food, clothing, trucks, tools, chemicals, medical supplies, transportation, engineering and communication equipment, and other goods for which there is a civilian market.

In addition, war contractors will have about 10 billion dollars of inventories, the bulk in specialized raw materials, goods in process, and finished products. Only about one-fifth of the total, or some 2 billion dollars, will be marketable or usable for civilian purposes. While the government takes over the usable inventory, the ex-war-contractors will have to build up their stocks for peacetime production, so that on balance, they will not be disposing of usable inventories in large volume.

Not even all of the usable war-end inventory will be "surplus" for sale to civilians in competition with new production. Some of it will be needed by the sizable peacetime Army and Navy we are likely to maintain, and such additional items as can be stored without serious deterioration or obsolescence will be held against possible future war emergencies. Some of it will be disposed of abroad. And up to half of it will be abroad and may be sold there or used for relief.

After allowing for these factors, the war supplies to be disposed of in our own markets probably will be less than 10 billion dollars (cost basis). While the total is not overwhelming—the equivalent of two months' retail sales—in certain lines the surplus will be several years', instead of a few months', normal supply. In particular, the volume of scrap metals available from otherwise unusable munitions will present a problem.

A great deal can be done now to reduce the size of the postwar surpluses by achieving a better balance between military needs and supplies and avoiding excessive inventories of particular raw materials or finished goods. This work needs to be pressed, not only to simplify our transition to peace but also to prevent wasting productive energies during the war. Furthermore, when the war ends on one front, inventories of war materiel should be worked down to the reduced scale of remaining military activity.

We cannot develop programs of action until we know approximately how much of each type of item is to be sold, and where and when it will be available. Wide margins of error are inevitable as long as large-scale procurement and large-scale consumption are still taking place; yet such information is essential and must be developed. Indeed, improved inventory records and estimates are badly needed for the conduct of the war as well as for managing the surpluses after hostilities cease.

In decisions on the disposal of war-goods inventories, the public interest must be the prime consideration. Proposals that none of these goods should be sold domestically because of competition with new production obviously are untenable. Everything that is not needed by the Armed Services or for other special purposes should be disposed of ultimately. The real problem is not whether surpluses should be sold, but rather to whom, at what price, and at what time the sale should be effected.

In the distribution of such large quantities of goods, we believe that established trade channels should be used wherever possible. Otherwise, we shall witness widespread speculation in war goods and the mushroom growth of inefficient and disruptive fly-by-night distributors. This will benefit only a few speculators and will discourage legitimate producers and distributors from making their normal commitments.

All war contractors should have the privilege of retaining those inventories for which they are willing to pay actual cost or a fair price negotiated with the gov-

ernment procurement agency. The balance of the inventories in the hands of war producers should be assembled by the government and sold in an organized manner. It is of great importance that the plants be cleared of these inventories at once so that the process of conversion to peacetime operation can proceed without further delay. To accomplish this, preparations must be made before the end of the war for speedy determination of the inventories to be moved and for a huge volume of storage space to accommodate them.

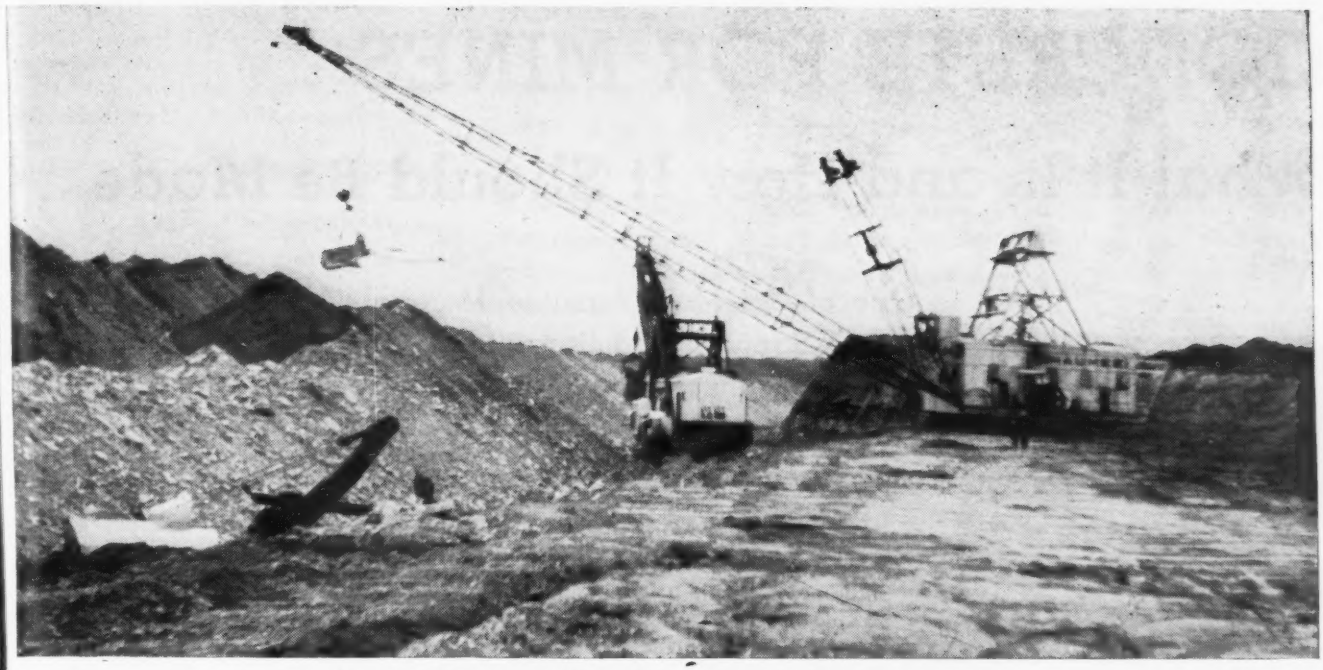
The price which can be realized and the timing of sale are closely related. Certainly the best prices will not be secured if the government attempts to dispose of large supplies of material and products suddenly without regard to market conditions. Most businessmen rightly favor an early transfer of surplus inventories from government to private ownership. But, they also realize that if all the surpluses are dumped indiscriminately as they become available, many markets will be badly depressed, and the resulting low prices will bring lower production. If this depression effect becomes general, as it easily can, it will be costly to the nation in terms of jobs, income, and goods.

In industries in which production is inadequate to meet postwar demands, an immediate sale of government inventories can prevent inflated prices and preserve balanced market conditions. In cases in which the surpluses are large in relation to annual production, the disposition can be scheduled over a period of years. Generally, however, it will be best to clear the surpluses as quickly as orderly sale can be accomplished rather than to leave them as a continuing threat overhanging the market. Most industries can, and should, take the disposal process in their stride without special dispensations from the government. In this connection, it should be noted that the tax provisions for carry-back of losses and excess profit credits after the war greatly increase the possibilities for speedy disposal of surpluses without serious injury to producers.

There will be some industries, however, in which the postwar surplus is so large that it would practically saturate the market for years to come. The problem of these industries is further complicated by their wartime expansion of capacity many fold in excess of peacetime requirements. These lines of production are, moreover, crucial for our national defense. Aircraft and shipbuilding are cases in point. Each of these situations calls for careful study and discussion by all concerned to devise means to keep alive the necessary production organizations, the research effort, and the spirit of enterprise. Insofar as possible, the individual manufacturers should work out their own salvation in the conversion to peacetime markets. They can do this by taking on new lines, by increasing their production efficiency, and by developing technical improvements which make the existing inventories obsolete. But they still will need some kind of government protection or assistance while the huge surpluses are being worked off. It is most important, however, that such protection or subsidy be limited to a period of three to five years. It must not become permanent unless it is really essential for our national security.

The disposal of surplus inventories is part of the whole process of demobilization of the war effort and conversion to peace. If this process is to be accomplished with minimum dislocation and injury to our economy, it will have to be directed by a central agency which has developed adequate information service and is in position to coordinate the policies of the Armed Services and the other interested executive branches of the government. This agency should draw freely on the knowledge of businessmen in the specialized problems of marketing surpluses in each industry. It should formulate definite programs of inventory disposal for all industries in which the problem is acute; and it should make these programs public as soon as possible, so that business can plan for the future with confidence. In large measure, the success with which we make the economic transition to peace will depend on the quality of government administration in the process of industrial demobilization. We shall need better organization for the transition to peace than we had in mobilization for war if we are to avoid needless unemployment, loss of production, and frustration of business enterprise.

President, McGraw-Hill Publishing Company, Inc.



Stripping a rider seam with walking dragline for later shovel loading.

tion to its role as an auxiliary or utility machine where shovels are employed. As pointed out in the preceding material, the favored practice when draglines accompany other equipment is to operate them from the highwall. This also is true where draglines are used alone.

A typical set-up with a large electrically powered dragline is shown in Fig. 8. As frequently is the case, the top soil is benched off to make a firm foundation for the machine. The bench may be carried a cut in advance by swinging the machine and working over the area to be included in the next cut. Since the spoil is deposited on the top of the pile it has little opportunity to cause trouble.

Where overburden is not too thick, small draglines are operated much like large units. If the burden thickens, however, some operators follow the practice of loading the coal to the highwall and then filling the pit, either to the top of the highwall or, preferably, to the top of a bench cut. By benching, as shown diagrammatically in Fig. 9, the quantity of spoil to be rehandled is materially reduced. Fig. 9 also shows how the "key cut," discussed previously in this article, is made. Using the system, the center of the spoil weight is kept well away from the pit and chances of trouble are lessened.

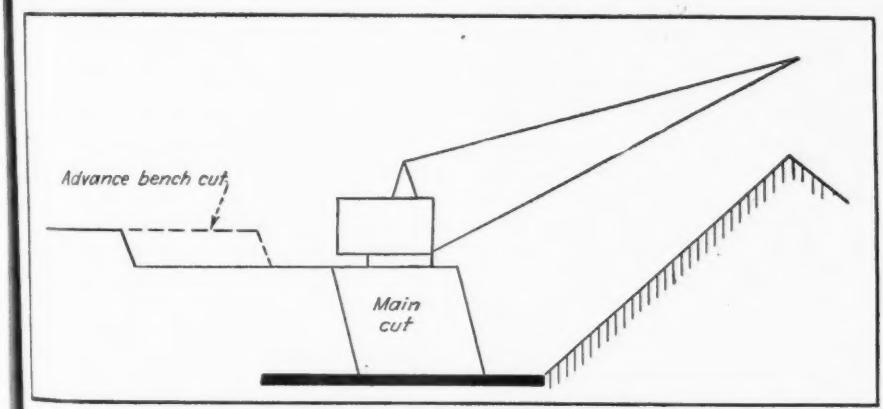


Fig. 8—Typical plan of stripping with large dragline on bank.

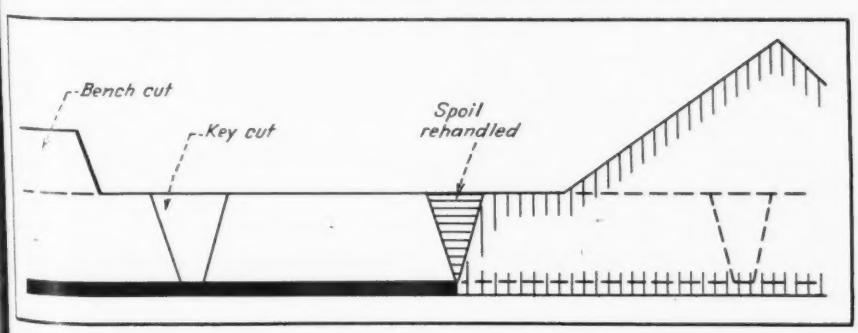


Fig. 9—Bench-and-fill method of stripping in deep overburden with small or medium draglines, using "key cut."

Experience in dragline operation has led some operators to the following conclusions on buckets: for medium shale, a long narrow bucket with four sharp teeth and a thin cutting edge; for rock or chunky material, a wide bucket; bucket teeth should be parallel with bucket bottom for better clean-up; bucket weight should be as small as possible, even at the expense of more frequent renewals, since the outgested for deep overburden are an gested for deep over-burden are an auxiliary boom section and a lighter bucket.

Deeper overburden has focused attention on methods of operating with shorter booms in such cover. Patent No. 2291669, issued in August, 1942, covers such a method. It involves, among other things, benching the highwall, filling in the pit to the level of the bench and operating from both the fill and the bench to spoil deep burdens with a materially shorter boom and rehandling of only a small portion of the spoil at the edge of the coal.

CONCRETE FOR MINES

What It Is and How It Should Be Made

One of the Most Versatile Materials for Mine Use, Concrete's Strength and Durability Depend on How It Is Made —Best Results Follow Attention to a Few Fundamentals

By ARTHUR E. BELTON*
Akron, Ohio

CONCRETE is the name given to a building material consisting generally of a mixture of broken stone, sand and some kind of cement. To these is added water, which, combining chemically with the cement, conglomerates the whole mixture into a solid mass and forms a rough but strong artificial stone. It has the advantage over natural stone that it can be easily molded while wet to any desired shape or size. Moreover, its constituents can be obtained in almost any part of the world and its manufacture is extremely simple. Scientific methods of reinforcing it with iron and steel have greatly extended its possible applications.

Although there are many other kinds of portland cement such as quick-hardening cements, cements that will harden below freezing temperatures and in extreme heat, admixture cements and others, the all-purpose type is the most widely used and the best all-around portland cement.

Concrete is particularly well adapted to use in mines since it has a remarkably high resistance to deterioration under the severest conditions of mine use. It is one of the most completely fireproof of building materials and is capable of withstanding severe shock without serious damage. Rich, dense concrete can be made waterproof against practically all heads encountered in coal mining. It may be reinforced or strengthened by the use of steel to sustain extremely heavy loads and at the same time is subject to a minimum of restrictions as to the mine and shape of the structure in which it is used. It is one of the most economical of all permanent building materials.

Where concrete is used for linings, in shafts, slopes, drifts, entries and underground chambers its smooth, dense surface prevents the lodgment of appreciable quantities of coal dust and eliminates pockets or openings in which explosive or poisonous gases may collect. A concrete surface provides the least resistance to the circulation of air in mine ventilation, thus reducing the load on the fans. It is a good reflector of light and helps to cut down the cost of illuminating entries and other underground chambers and passages. Today, mechanization imposes these new requirements on construction and they are met by concrete.

Much of the new construction as well as replacement and repair work around a coal mine can be done with concrete by mine forces. Major structures, however, such as shaft linings, main bottoms, tipples and large buildings, usually can be built more economically by regular construction organizations with the proper facilities and personnel.

Regardless of who does the work, there are certain fundamentals in the selection of materials and mixing and placing of concrete that should be observed in order to produce the most durable job. Too much emphasis cannot be placed on the importance of durability in concrete constructions. In the summary of good practice which follows, special attention has been given to the conditions pertaining particularly to mine construction and exposure.

Cement—The cement used should conform to the requirements of the standard specifications of the American Society for Testing Materials. It should be stored in a dry building or under waterproof coverings to protect it from hardening due to dampness. Storage in the mine may result in some loss of strength, especially when the mine is damp.

Fine Aggregate—Sand should be clean and free from particles of shale, fireclay or loamy matter. It should not contain clay, silt or coal dust totaling more than 5 percent by volume. It should be well graded in size. Not more than 4 percent should pass a 100-mesh sieve and not more than 10 percent should be retained on a sieve with ¼-in. square openings. Organic matter or tannic acid which may be present, especially in sand deposits taken from the vicinity of oak or hemlock trees, is very objectionable in material quantities.

To detect these substances, place 6½ oz. of sand in a 12-oz. flask, fill the flask to the 8-oz. mark with a 3-percent solution of sodium hydroxide, shake well and let stand for 24 hours. Then, if the liquid above the sand is darker than yellowish straw, the sand should be tested in a laboratory before it is permitted in concrete. Lignite and some coals will give a dark color although they may not be present in injurious quantities.

Coarse Aggregate—Many of the natural rocks in and around a coal mine are not suitable for making good concrete, especially slates, shales, fireclays and soft sandstone. These materials tend to disintegrate at the surface of the concrete, thus paving the way for progressive damage. Bone coal, lignite and cannel likewise are undesirable in

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First of a series of articles abstracted from a thesis prepared in 1943 and submitted for a degree in mining engineering, School of Mines, West Virginia University. The work was done under the direction of Prof. G. R. Spindler, to whom special credit is due for his kindly supervision. The author acknowledges also the assistance of the School of Mines and its staff; R. G. Mason and the Portland Cement Association for material, photographs and special data; Fred A. Davis, materials engineer, W. Va. State Road Commission; Department of Civil Engineering, U. S. Coal & Coke Co.; Prof. Walter Grow, Mechanical Engineering Dept., W. Va. University, and others.

Publications of the Portland Cement Association found helpful in preparing the material in this particular article include: "Concrete in Coal-Mine Structures," "Design and Control of Concrete Mixtures," "Concrete" and "Applications of Concrete."

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concrete either because of their structure, sulphur content or low resistance to weathering.

For the coarse aggregate in concrete it is desirable to use only clean, tough, crushed natural stone or gravel. Air-cooled blast-furnace slag weighing not less than 70 lb. per cubic foot also is acceptable for most purposes. Clean steam-boiler cinders with clinkers and large lumps removed make good aggregate for concrete blocks and for certain structures around the mine.

The size and grading of coarse aggregate will depend upon the particular use, but ordinarily it is desirable to use material retained on a ¼-in. screen, not more than 15 percent of which is retained on a 2½-in. screen. Thin or heavily reinforced sections may require a maximum size of ¾-in. Bank-run materials always should be separated on the ¼-in. screen and re-assembled in definite proportions for any but very minor work.

Water Quality—Water for mixing concrete should be suitable for drinking purposes. Mine water often contains chemicals injurious to freshly placed concrete and should not be used unless tests or previous experience indicate that it will have no harmful effect on durability. Polluted waters ordinarily do not affect the strength of concrete much, but they may have a serious effect on resistance to destructive agents such as highly acid mine water and certain corrosive gases. Generally, however, mine water will have no ill effect upon hardened concrete.

Mixing—Mechanical mixing should be used whenever possible. For ordinary purposes one full minute of mixing will suffice, but for work which must be watertight, a minimum of 1½ minutes should be required, counting from the moment all materials are in the wiper drum until dumping starts.

Table I—Recommended Slumps for Concrete*

Type of Structure	*Medium Slump, Inches*	*Maximum, Inches*
Massive sections, pavements and floors laid on ground	1	4
Heavy slabs, beams or walls	3	6
Thin walls and columns, ordinary slabs or beams	4	8

*"Design and Control of Concrete Mixtures," Portland Cement Association, p. 65.

TEN RULES OF GOOD CONCRETE

1. Use only clean, sound, weather-resistant aggregates of known quality, with portland cement.

2. Use the proportion of cement to mixing water that will produce the strength or weather resistance required. (See Table II). With this quantity of cement and water, use sand and coarse aggregate in such quantities as will produce a workable concrete under the specific conditions of placement.

3. Be sure that the concrete is thoroughly and uniformly mixed.

4. Place the concrete so that the aggregates will not separate, thus forming honeycomb spots.

5. Protect the work from extreme temperatures. Heat the aggregates and water for winter work and protect from freezing. Cure freshly placed concrete with water where exposed to rapid drying out due to heat.

6. Keep the concrete wet for several days after it has hardened.

7. Do not use admixtures unless you know what the result will be.

8. Give the concrete a chance to acquire the necessary strength before placing it in service.

9. Clean out all laitance before placing fresh concrete on top of material that has hardened. Where watertight construction is necessary, it is well also to remove some of the concrete immediately below the laitance.

10. Cover all reinforcement sufficiently to prevent corrosion.

Hand mixing often is necessary in some parts of the mine. It should be done in a watertight mortar bed or on a tight platform. The most uniform mixing will be obtained if the fine aggregate is first spread out on the platform, followed by the cement and coarse aggregate and the whole mass turned over three or four times before water is added, a little at a time, in a crater in the center of the mix. Hand mixing should continue until the mass is of uniform color throughout and all stones are well coated with mortar.

Placing—Concrete should be placed in the forms before it has stiffened. Under ordinary conditions this will be within one hour of mixing. In placing, the surface should be kept as nearly horizontal as possible, as honeycombing or sand streaks are likely to follow heaping in one place. Concrete should be carefully spaded to insure complete filling of the form and the elimination of impounded air and excess water. Good tools for this purpose are a stout hoe bent out straight with the handle or a flattened bar of ¾-in. steel. A piece of 1x6-in. lumber in the form of a paddle also is effective. Hammering on the form studding at point of placement helps to compact fresh concrete.

Water Quantity—There is never any excuse for making sloppy concrete. Not only does too much water weaken the concrete, make it porous and lower its resistance to weathering, but it results in a mix that cannot be placed without segregation. For good concrete it is essential that it be homogeneous and uniform throughout. This is impossible where the heavier aggregate particles can settle to the bottom. The best general-purpose mix is one that is just workable and which does not show standing water in the form. A mix which will hump up on a shovel and still look plastic is about right for most purposes.

Slump Test—A rough measure of consistency that may be used is the slump test, which should be made in accordance with the A.S.T.M. "Standard Method of Test for Consistency of Portland Cement Concrete." This test is not an absolute measure of work-

ability and should not be used to compare mixes of wholly different proportions or of different kinds of aggregates. To avoid mixes too stiff or too wet, slumps falling within the limits given in Table I are recommended. Typical slump ranges for a few types of structures are set out in the table.

Proportions of Aggregate and Cement—Recent advances in the knowledge of concrete and its behavior have developed the fact that both strength and water-tightness are determined by the strength and water-tightness of the cement paste holding the aggregate particles in the mass. These qualities in the paste are fixed by the relative quantities of cement and water used. Any water in excess of that required for a reasonable degree of plasticity in any mix serves only to dilute the mass, reducing both strength and resistance to the penetration of moisture.

Experimental studies have shown a direct numerical relation between strength of concrete and quantity of mixing water and also that the degree of resistance to exposure can be measured, in the same way, by the quantity of water used with each sack of cement. This being true, it follows that to choose concrete for any piece of work the best procedure is to select a water-cement ratio that will meet the given conditions and then find, by experiment, a combination of fine and coarse aggregates which, when used with water and cement in this proportion, will give a plasticity suitable for the particular work.

Table II shows water quantities for concrete in various structures, together with the compressive strength developed at 28 days when cured in a moist condition. All materials do not give exactly the same strength for the same water-cement ratios, but the values in this table are representative of average materials where the other requirements of good construction are followed. Those other requirements are proper curing, thorough mixing and careful placing in a condition of plasticity that prevents separation of the material or honeycombing. Note that the moisture in the aggregates must be included as part of the mixing water.

In fixing the proportions of the mix, the ratio of coarse to fine aggregate generally should range from a minimum of about equal parts of coarse and fine to a maximum of not to exceed two parts of coarse to one of fine. Generally, best economy will result from the use of from 1½ to 1¾ parts of coarse for each part of fine.

Support of many surface structures at coal mines, such as this fan installation, is cheaply and easily provided by concrete.

Table II—Classes of Concrete for Different Degrees of Exposure*

Class of Concrete (Expected Strength at 28 Days, Lb. per Sq. In.)	*Maximum Quantity Mixing Water, U. S. Gal. Per Sack of Cement (94 lb.)†*	*Type of Structure and Degree of Exposure*
3,000	6	Shaft and slope linings. Roadways and tanks. Thin structural members under severe exposure. Walls, dams, piers, etc., where exposed to severe action of water and frost.
2,500	6¾	Sump and ditch lining, track supports, sewers, bridges, walls, dams, piers, etc., for all weather conditions and moderate action of water and frost.
2,000	7½	General mine structures, stoppings, entry linings in dry conditions. Ordinary inclosed reinforced-concrete buildings. Bridges and retaining walls of heavy sections in moderate exposure.
1,500	8¼	Mass concrete, basement walls, etc., protected from water or severe weather conditions.

*Concrete, Portland Cement Association. †Free water or moisture carried by aggregates must be included as part of the mixing water.

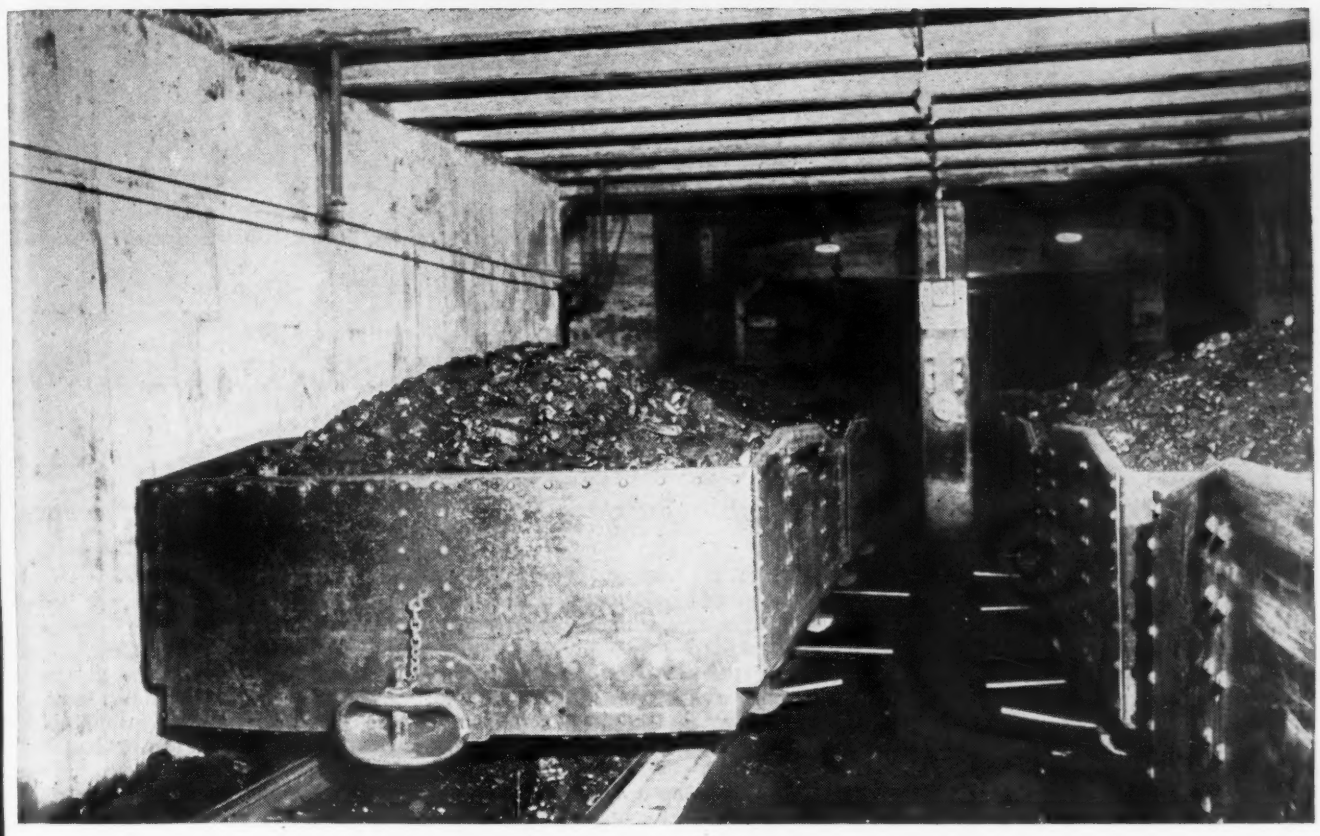
Forms—Forms should be watertight and well braced. The pressure of wet concrete which a form must sustain varies with the depth and rate of placement. Forms generally are designed to withstand a lateral pressure equal to that of a liquid weighing 125 lb. per cubic foot. In flat roof work they should be designed to hold the dead weight of the concrete, which may be taken at 150 lb. per cubic foot

Through-bolts or wire ties may be used in wall work to hold the forms. Wire tires should be used only when the cut ends will not be exposed to moisture after the forms are stripped. Bolts should be given a half turn occasionally during the hardening period. A bolt threaded on both ends is used so that it may be pulled out and reused. Temporary wood spreaders of 1x2-in. stock are used at each bolt or tie to hold the forms apart until the concrete reaches this level. The spreader then is removed, since if left in the concrete it may swell and crack the work or decay and leave a channel for the passage of water.

All reinforcements should be purchased under the current A.S.T.M. standard specifications. Either billet or rail steel bars may be used.

Reinforcement should be so placed that it will be covered by at least 1 in. of concrete in roof slabs or walls and 2 in. in beams and columns. This should provide ample fireproofing. Where water is encountered, all steel should be covered by at least 2½ in. of sound concrete to prevent corrosion which will cause the concrete to spall or split. Steel should be free from loose scale or heavy coating of rust.

Removal of Laitance—When concrete



Concrete's versatility underground is shown by such applications as this example of shaft-bottom protection.

is placed to any considerable depth, spading combined with excess of water usually will cause fine materials, dirt and scum to rise to the surface. This solidifies in a soapy layer and is called laitance. It has very little, if any, strength and should be scraped off as soon as the concrete has stiffened. If left in place it will disintegrate and leave a weak spot in the structure. Water goes through laitance planes quite readily.

A thick layer of laitance is evidence of gross excess of water. In such cases the accumulation of water at the top results in a porous concrete in the portions just below the laitance. The practice which results in this condition should be avoided.

Curing—Proper curing during the first 7 to 10 days is necessary to obtain good concrete. Care in this important detail often will double the strength and wearing qualities of the finished product.

In midsummer a hot sun and drying wind may remove some of the moisture necessary to proper hardening unless the concrete is sprinkled frequently. Below ground a too dry ventilating current may have a similar effect.

Cold-Weather Precautions—Concrete hardens very slowly at temperatures below 60 deg. F. and practicaly not at all at freezing temperatures. In winter there also is danger that freshly placed concrete will freeze. Alternate freezing and thawing will completely destroy the concrete, while a single freezing may impair the strength and durability of the structure. Consequently, special precautions are required in cold-weather work. There is little likelihood that concrete will ever be subjected to freezing temperatures below ground except, sometimes, shaft linings.

Heating aggregates and mixing water and inclosing the work, with provision for artificial heat over a period of five or six days, is the usual method of protecting concrete. If it can be kept at around 60 deg. for this period, it will have attained sufficient strength to make it safe against freezing. More specific information on cold-weather concrete work will be found in publications on the subject.

Admixtures—A number of substances have been used on concrete with the idea that they improve its quality. The claims made for them fall in three general classes: (1) improved workability and density of concrete; (2) faster hardening; (3) protection from freezing.

In the first case some finely divided substance is introduced as a powder in the mixer with the cement. As a general rule these substances do not accomplish anything that cannot be more cheaply and advantageously accomplished by the addition of an equivalent quantity of portland cement. In some cases they may even have an injurious effect on the strength or durability of the concrete.

Substances of the second class are largely composed of calcium chloride. With some cements they do hasten the hardening and may be helpful with such cements in cases where they produce sufficient strength in three or four days to avoid possibility of freezing.

Substances added to prevent freezing are to be avoided. Calcium chloride and common salt are the most common of these. When used in sufficient quantity to lower the freezing point of water materially they are positively harmful. Calcium chloride in excess of 2 or 3 percent by weight of the cement will lower the strength of the concrete. In this proportion it lowers the freezing point practically none at all.

Before using admixtures of any character it is well to determine by actual test or reference to existing data the results to be expected.

THE FOREMEN'S FORUM

What Occurs Above Mirrors Action Below

Autumn Brings Leaves, and Winter, Snow to Indicate Behavior of Wind When Blocked by Impassable Barriers Such as Room or Heading Faces

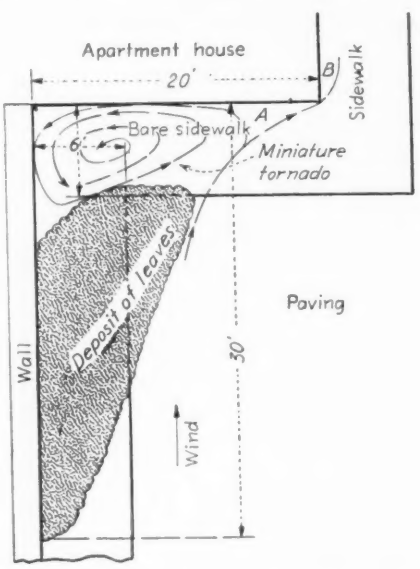
TO UNDERSTAND what happens in the mines look outside, where causes and effects are more readily visible than underground. This is a generalization worthy of thought in relation to all phases of mining but also specifically applicable to aerodynamics—the study of moving air and therefore of ventilating currents.

Leaves Show Wind Does Not Strike Face—When Union Turnpike in Kew Gardens, N. Y., was widened, a six-story apartment house stood about 20 ft. out over the western line. The prevailing wind drives leaves along that spacious highway toward the rear of the building skirting a high wall that guards the edge of a bridge which spans the Long Island R.R. However, the leaves are not plastered against the apartment house, but about 6 ft. away at the nearest point and 30 ft. away as the wall against the Long Island R.R. is approached, the point where the escape of the air is most completely restricted (see illustration). A small whirling tornado always prevents the prevailing wind from reaching the apartment house except toward the exposed angle where the turnpike narrows.

Given an Exit the Air Deposits Its Leafy Burden on the Very Face of the Obstruction—But leaves, though they cannot be driven against a house directly, frequently are plastered by a direct wind against fences and hedges, for the air can go through these obstructions and carry the leaves with it up to the face of the fence or hedge. Leaves also accumulate along the curbs of the streets, not so much because the wind strikes the curbs end on but because the leaves, propelled by sideling winds, travel along the curbs until obstruction or the curbs themselves limit their travel.

Sails and Snow—It has been found also that when holes are made in the sail of a boat so that the air can pass through its bellying canvas, the full pressure of the wind is exerted on the sail, but, if there are no holes, the travel of the boat is slowed, for the direct wind is kept from the sail by a revolving cross wind that cushions the impact of the driving air current. Moreover, like leaves, snowflakes do not usually pile up against a house but are deposited a short distance away. The drifting snow forms a pile near the house but not against it.

Methane and Dust Are Similarly Retained—Similarly, in the mines, revolving currents circulate in front of the face, merely stirring up the methane and fine dust and not carrying it away. They tend rather to deposit the fine dust along a line paralleling the face and at a distance from it. This action is all the more pronounced because, unlike the condition illustrated, the only exit for the air is in the reverse direction to the prevailing wind, which, with auxiliary ventilation, enters through an air tube. Here there is no side exit by which the air can escape, so it is almost completely trapped by roof, floor and sides.



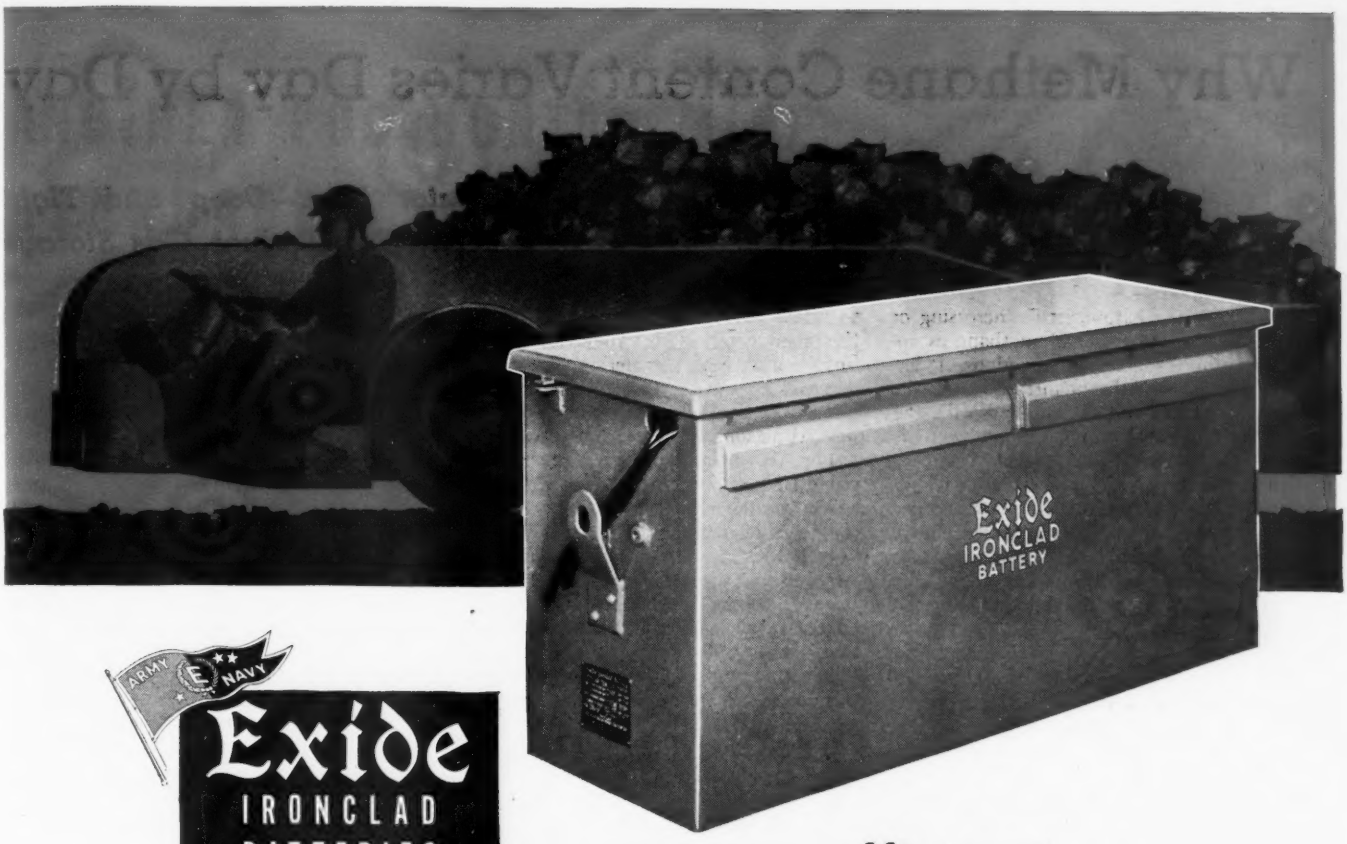
Just as leaves, when arriving at, or near, a right angle, are not deposited against an obstructing wall so, at the end of a room, suspended coal dust is laid down away from the face.

Least of the considerations is the power loss. Most serious is the inevitable concentration of methane and fine dust, which latter whirls and stays near the face, some of it dropping to form a small ridge at the line where the whirl meets the entering air. Here it will be deposited just as the leaves are laid down in the illustration. This dust is not carried so far from the face that it cannot be raised from the floor by a blow-out shot.

Use Less Air and Distribute It Better—It would be better to use less air, thus raising less dust and providing a straight line for its passage to the return of the room. This dust would then not be loaded out, and thus handled many times on its way to the railroad car. Where the coal is to be washed, this fine dust usually is not saved but enters the streams and thus is lost to the operator and deposited in the stream beds, or carried into the drinking water and into industrial boilers and domestic furnaces. Thus, it is a clear gain to have it back in the room where its capacities for mischief are less marked, provided, of course, it will not start mine fires.

Thus the problem is to find a way to get the air to the face so as to keep the face clear. It would be easy enough to do this if we could safely set a deflecting surface at the face that would give the current a turn that would direct it to the correct angle. But even to direct the air tube against the rib at some distance from the face might help to turn the trick and do a somewhat better job of scouring the face and save the miners also from some discomfort from the impact of the air on their backs.

Ventilate Roof or Floor?—A smooth plate might be placed between the end of the tube and the face, so set as to cause the air to be lifted to the roof and incidentally away from the dust which we might not want to raise. But is it at the removal of the methane at the roof that our efforts should be directed? Most of the methane is made in the undercut (when an undercut is made), and if the current were directed there the roof would not need so much attention.



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Why Methane Content Varies Day by Day

9,000,000 Ft. of Goaf Gas Daily May Enter Mine—Deep and Tight Methanous Mines Suffer Most—Rock Falls May Not Reduce Gas Storage

EFFECT OF the barometer in increasing or decreasing the quantity of methane escaping from mined areas is tremendous. It has much to do with the quantity of methane in both intakes and returns and with the gas hazard in coal mines. Suppose all the pillars of the mine are still standing, and that the roof has not fallen. On a fall of the barometer, the methane can escape from these open spaces even if completely inclosed by so-called "tight" stoppings, for under pressure it will travel through the stoppings, through roof and floor or through the coal itself.

Spaces in Goaf—Even if the roof has fallen, there will be spaces above and in between the fallen rocks where the methane can collect and some of it ultimately can get away. Rock in falling may seem sometimes almost to fill the space into which it falls, making further falls impossible, but, unless it is shale or clary, the rock will not expand and there will be just as much open space after the fall as there was before. Though the space now will be very greatly divided, it will hold just as much methane as ever. It may look like a solid mass, but it will be far from solid. Some air may have entered around the edges of the open spaces, but it probably has not greatly diffused into the methane, though when such air comes through crevices from the surface, the air being above the methane and heavier than it, falls by gravity through the latter, diffusing as it falls. But, in many cases, such air will not enter because the outflow of methane and the narrowness of the channels will prevent it.

If the mine area covers 2,500 acres, almost 2 miles square, it will embrace an area of 108,900,000 sq.ft., of which, perhaps one half, or 54,450,000 sq.ft., will be open, and if the seam as removed is 5 ft. thick, the volume will be 272,250,000 cu. ft. Assume a fall in barometer of 1 in., the quantity of goaf gas entering the mine will be about one-thirtieth of that volume or 9,075,000 cu.ft. However, not all this will be methane. In mines that are not methanous, the goaf gas will have a low methane percentage.

Some of the goaf gas will probably be carbon dioxide, though we do not know to what extent props and coal in an atmosphere of methane will emit that gas; probably little if at all. Some will be air that has entered around the edges of the area when the pressure was higher, and some, air that had entered through crevices from the surface and perhaps mixed by gravity and diffusion with the methane. But, however much it may be whittled down—and it doubtless is so whittled—the quantity still is tremendous.

Danger in Airtightness—It has been said frequently that the room workings should cave and so prevent accumulations of methane, but probably safety does not demand so much that the rocks fall and block up the open spaces, as that they crevice to the surface, and so let the methane escape. Air entering a room creviced to the grass roots will not, under increased barometric pressure, drive out the methane, because the change in pressure on the surface of the ground is equal to the change in pressure below ground. In consequence, some of the needs of the large contracting area may be met by air entering direct from the surface and not through the mine. However, the emission of methane may more than offset the fall of the barometer and, in that case, air will not enter but methane escape. When the air pressure decreases, both the mine and the surface share in the escaping gas.

Vent Above Is Important

It is not so much filling the chamber with rock as giving it a vent above it that is important. Very deep mines have difficulties in getting such vents, and some discharge most unfortunately into other working beds of coal instead of venting to the surface. It must be remembered, however, that with an increase of barometric pressure, the methane may be kept from escaping to another working seam, for the increase will be the same in both seams and some of the vacuum created will be filled from the surface where there are crevices reaching thereto.

Enough has been said here to explain the irregularity of the emission of methane. In a mine with a roof that is self-repairing or airtight, all the effect of lower barometer must be met by the removal of goaf gas from the workings, and it is these operations that at times develop such high concentrations of methane and accordingly are so dangerous. Some have clays and shales which seal crevices, and also water in the upper measures that, with the small size of the pores, make the escape of goaf gas to the surface impossible. Such mines may have 300,000,000 or so cubic feet of methane.

The Nub of the Argument—To get an approach to uniformity in methane output, arrange if possible to get complete rock falls with fractures to the surface. Much of the methane will escape to the grass roots, and the production of methane then will be wholly from working faces or pillars almost ready for extraction. The safest way for methane to leave the mine is through the roof. Every gassy mine should have a recording barometer, and the foreman should know, before the mine makes its daily start, whether the barometer is rising or falling and whether the rise or fall is rapid or slow.

If the barometer is falling, he should speed up the fan, and warn his supervisory force that they should watch for methane at the faces. These faces will not develop any more methane than before, for low pressure will not drag methane from its hiding place in coal but, as the intake air entering the faces will carry more methane, there will be less leeway when the normal quantity of methane is added at the face. It may be necessary then to shut off some of the working faces that add materially to the methane content.

In some highly methanous mines with tight roofs, it will be profitable to drill the roof from the surface so as to drain off the gas, replacing it with intake air from the mine and thus (1) removing a menace, (2) evening the curve of methane emission of the mine, (3) making it unnecessary to speed the fan unduly and beyond its efficient range of operation, (4) permitting the development of the mine without regard to barometric height and (5) rendering unnecessary, perhaps, a new fan or a new shaft or a series of airways to carry off the methane.

•

Two Specific Gravity Bases—Air and Water

Because of the great difference in weight between gases and liquids or solids two specific gravity units have been chosen: (1) water at the temperature at which it is densest, 39.3 deg. F., and under a pressure of 29.92 in. of mercury, a normal atmosphere pressure at sea level; and (2) air at 32 deg. F. and under a pressure of 29.92 in.

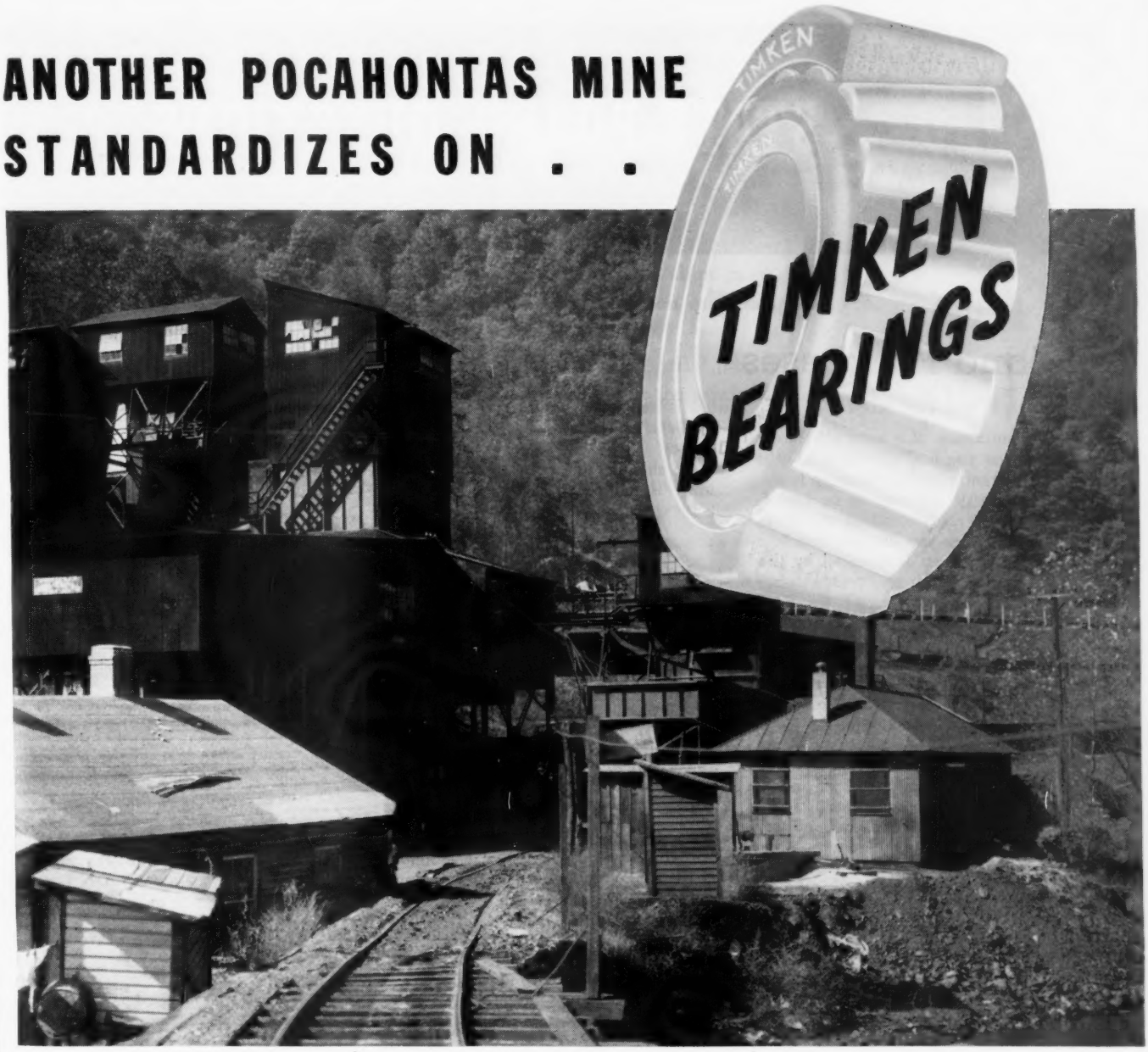
As the weight of a cubic foot of water at the temperature and pressure given is 62.356562 lb. and the weight of a cubic foot of air at the temperature and pressure given is 0.08071, the unit of specific gravity for liquids and solids is 772.6002 as great as the unit of specific gravity for gases.

•

Did He Hand You Good Or Bad-Practice Card?

In an effort to improve its wartime safety record, the Pittsburgh Coal Co., Pittsburgh, Pa., has instituted the practice of handing out "good-practice" and "bad-practice" cards. These cards, which are printed on the face in red, white and blue stripes, and on the reverse have spaces for drawing attention to safe and hazardous practices, are handed out by company inspectors, who, at irregular intervals, make the rounds of the company's operations. When any employee, from helper to superintendent, is found engaged in a careless or hazardous practice, the inspector who notes it hands him one of these cards. But good practice is given equally prompt recognition.

ANOTHER POCAHONTAS MINE STANDARDIZES ON . .



Tipple at the Algoma Coal & Coke Company's mine, Algoma, West Virginia.

Ever since the Algoma Coal and Coke Company placed its initial order for Timken Tapered Roller Bearings in June 1941, Timken Bearings have been steadily replacing friction bearings in this company's mine cars as fast as the friction bearings wore out. Many additional orders for Timken Bearings have been received since 1941.

This process will be continued until all the mine cars are operating on Timken Bearings, because officials of the Algoma Coal and Coke Company are convinced it pays to have the longest-lived bearings they possibly can purchase.

More than 1,000 other mine operators feel the same way about it — have felt that way for years. Over half a million Timken Bearing Equipped mine cars have been placed in service during the last 25 years. The Timken Roller Bearing Company, Canton 6, Ohio.

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TAPERED ROLLER BEARINGS

STATE-BOARD QUESTIONS

Indiana Firebosses

When Fan Stops

Q.—On examination of a mine generating explosive gas you find the ventilation in good condition and that nowhere is any accumulation of methane to be found, but as you get ready to admit the workmen to the mine you discover that the ventilation has been interrupted by the stoppage of the fan or some other cause; what would you do?

A.—Sec. 23 (b) of the Mining Laws of Indiana declares that "it shall be unlawful for any person to enter any mine or part of a mine generating firedamp until it has been examined by the fireboss and reported by him to be safe." I have found the place safe but now know it to be extremely unsafe by reason of the fan stoppage or some other cause, a heavy fall perhaps, and I have authority therefore to keep any men from entering at least that section of the mine which I am supposed to guard.

Under the stringency of the situation, I would be disposed to exceed my authority and keep all men out of the mine until the mine foreman arrives and himself gives such an order. I would try to get in touch with him as soon as possible, not deserting my post meantime, for the important matter is to keep the men out of the mine and, if possible, to arrange to get any men who have gone ahead to come back promptly, using the telephone for that purpose, if the air current has just stopped or, almost regardless of the passage of time, if permissible telephones that can be used with safety in methane are provided.

But as the power should be disconnected by the engineer, who should be notified, the locomotives will be unable to proceed and the lights at the bottom and at the switches will go out. These evidences will make the men question whether it is safe or convenient to proceed, for this same de-energizing of the line, if it had occurred from high-line power failure, would also have stopped the fan and produced the condition now confronting the operation of the mine, but in that case probably some standby engine could restart the fan and reestablish ventilation in a few minutes.

The men probably will stop when the fan stops and the electric current is cut off and will await the reestablishment of ventilation and the return of power to the lines, the more so as the locomotives will not be available to take them into the workings until the power returns. But what is needed is to bring the men out, and the telephone is the means by which that best can be effected. When started, the fan should run until the methane percentage is normal, after which the power can be switched on the feeders.

Flood Dangers

Q.—You find one morning a large quantity of water pouring from a section of your mine; you have an 800-gal.-per-minute pump stationed nearby. How would you control the water until you can build your permanent seals?

A.—I would erect a temporary dam, if possible, nearer to the source of the escaping water than to the point at which I expected later to erect a permanent dam. A pipe with valve should be put through this dam and connected with the pump. The building of the permanent dam should follow as soon as possible, unless the pump proves fully equal to handling the inflow of water and no greater flow is to be expected.

Exhaust and Force Fans

Q.—(a) What is an exhaust fan? (b) What is a blower fan?

A.—By an "exhaust fan" (see A, Fig. 1) usually is meant a fan at or near the surface that forces the air directly OUT of the mine by the movement of its blades, which is just the reverse of what one would expect from the name of the fan. The air being forced out, the pressure of the air in the mine becomes less than the pressure of the atmosphere. Accordingly the atmosphere, which always is under its own pressure, forces air into the mine at the intake.

"Exhaust" comes from a Latin word meaning "draw out," but, of course, the air cannot be drawn out. You can't tie a rope on it and draw it out, but you can force it out and then the pressure of the outside atmosphere will do the rest. The air actually seems to be drawn in, and we say it is "sucked in" and sometimes we say it is a "suction" fan that does the work, but really it is a force fan working in reverse, pushing air out of, not into, the mine.

(b) Assuming the blower fan (see *B*, Fig. 1) is a main fan at or near the surface,

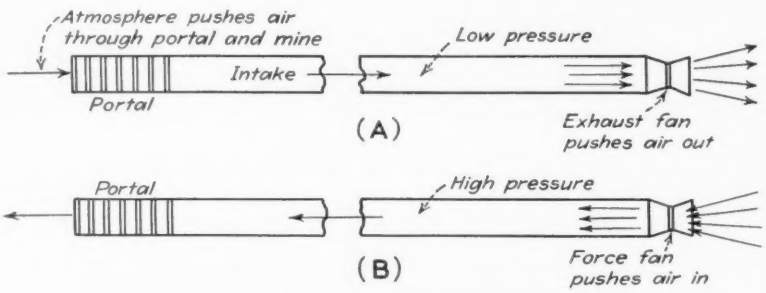


Fig. 1—It's a matter of placement and connection, not construction. (A) An exhaust fan that pushes air out of mine. (B) A blower or force fan that drives air into mine.

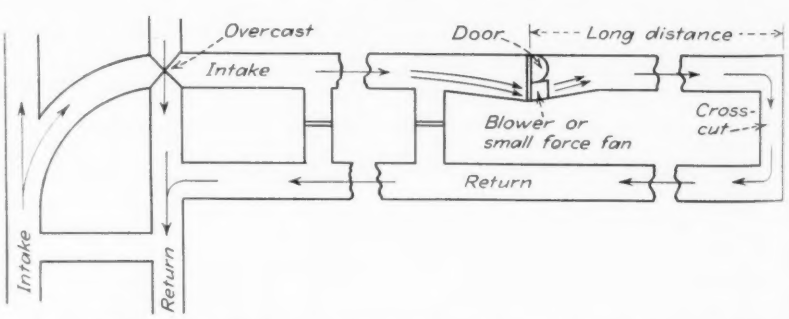


Fig. 2—What some people mean by a blower fan—a fan for local ventilation only usually for a long split.

That more planes may fly

Today, endless caravans of giant trucks are rolling night and day all over the face of America . . . all dedicated to but one proposition: That more planes may fly . . . that more ships may come down the ways . . . that a nation may have everything it needs to fight—*and win!*

To perform this essential job . . . to make sure that it will be done in the minimum time and with the minimum cost in equipment, manpower and precious fuel stores . . . the country's biggest operators are using the power that, for more than a decade, has been setting the pace in economy, speed and dependability—*Cummins Diesel Power.*

So marked has been this trend to Cummins in the motor transport field that 90% of all long-line, heavy-duty, diesel-driven trucks are now Cummins-powered. Here is ample proof that major fleet owners have learned that the surest way to "get there fustest with the mostest" is to power with Cummins Dependable Diesels. CUMMINS ENGINE COMPANY, Columbus, Indiana.

This is the fifth in a series of advertisements depicting the war-time role of Cummins Diesel Power in the nation's basic industries. If you are operating Cummins Diesels on your job, make doubly sure of their most efficient use by providing for their proper maintenance and service. Ask your Cummins Dealer for details.

such a fan forces air INTO the mine and raises the pressure there, driving air out of the mine at some distant point. In consequence, the air in the mine is everywhere at a higher pressure than that of the atmosphere at the surface.

However, it must be admitted that a blower fan (see Fig. 2) often is correctly understood to mean a fan inside the mine that takes part of the air supplied to it by the main fan and forces it into a section of the mine in greater quantity than could otherwise be forced into that section without the use of the blower fan. Like all mine terms, they mean different things to different people and different things in different parts of this country. The heading in the illustration is shown as broken but in reality it is a heading hundreds of feet long with many crosscuts.

Mine Examiners, Illinois

What's in the Air?

Q.—What elements and compound gases compose atmospheric air and what is the percentage of each (a) by volume and (b) by weight?

A.—The principal constituents of atmospheric air are oxygen and nitrogen and under "nitrogen" usually are included several gases that, until Sir William Ramsay segregated them, were regarded as nitrogen —namely argon, neon, krypton, xenon and helium. With that understanding: (a) the percentage of each by volume is oxygen, 20.94 percent, and nitrogen and its associated gases as listed above, 79.06 percent; (b) the percentage of each by weight is oxygen, 23.02 percent, and nitrogen with its associated gases, 76.98 percent.

Besides these chief components, air has from 0.2 to 0.4 percent by weight of carbon dioxide, depending on the location where the sample is taken. Around cities the percentage is high. Argon of nitrogen's associated gases is more important; it occupies 0.932 to 0.942 percent of the volume of air and 1.432 to 1.443 percent by weight. Next in importance by weight is water vapor. At 60 deg. F. (mine temperature) saturated air will have 0.01105 lb. of water vapor per pound of dry air. Therefore, the quantity by weight will be 1.105 percent. Air in the mine nearly always is near saturation, and has therefore about that quantity of water vapor which, of course, is to be regarded as a gas.

The other associated gases are neon, helium, krypton and xenon, naming them probably in the descending order of importance. On the volumes and weights of these in air the authorities differ widely because it is so difficult to approach purity in separation and refinement and possibly also because some air may contain more of any particular gas than others, for all the gases except helium are heavier than nitrogen, and krypton and xenon are much heavier and in extremely small quantity. Helium, on the other hand, is much lighter than nitrogen and may disappear above the earth's atmosphere. Ammonia sometimes appears in small quantities.

Writing in the Encyclopaedia Britannica, 14th Edition, Vol. 2, p. 333, J. W. Strutt and R. J. Strutt declare that "Argon is soluble in water at 12 deg. C. to about 4 percent; that is, it is about 2½ times more soluble than nitrogen. Density of argon prepared and purified by magnesium was found by Sir William Ramsay to be 19.941 on the O=16 scale. We should expect to find it in increased proportion in the dissolved gases of rain water. Experiment has confirmed this anticipation. Positive-ray investigation of F. W. Austin indicates that argon consists in the main of one isotope A^{40} of exact atomic weight 39.971. A small additional quantity of A^{36} amounting perhaps to 1 percent of the whole is present. Argon is monatomic."

J. R. Partington, Encyl. Brit. 14th Ed., Vol. 2, p. 640, declares "Slight changes in composition do occur, however, at the surface of the earth and these depend on latitude and the presence of large quantities of vegetation or sea water." With argon constituting almost 1 percent of the earth's atmosphere, it cannot be rightly regarded as a rare gas. It may profoundly modify blackdamp.

Q.—What is the water gage corresponding to a ventilating pressure of 7.8 lb. per square foot?

A.—Water covering an area 1 ft. by 1 ft. and an inch deep will weigh 5.2 lb. An area 1 ft. by 1 ft. is 1 sq.ft., therefore the pressure which such a volume of water imposes on the area on which it lies accordingly is 5.2 lb., so the pressure is 5.2 lb. per square foot. The pressure of 1 in. of water is termed 1 in. of water gage and we have seen that it is equal to 5.2 lb. per square foot. (See illustration). The pressure 7.8 lb. in the question must be due to a greater depth of water in proportion to the greater pressure. As the pressure of 7.8 lb. is 1½ times the pressure of 5.2 lb. (that is, 7.8÷5.2=1.5) the water gage must be 1.5 in.

Q.—When do you consider a mine properly ventilated?

A.—A mine is properly ventilated when sufficient air is traveling in the mine to comply with the requirements of the mining law, provided that this air is properly distributed so as to supply each part of the mine with enough air to satisfy legal requirements. The air current must also be conducted to each working place and made to sweep the face of the coal in sufficient volume and with such velocity that methane will not accumulate; thus will the workings be made safe and also healthful.

Figuring Out Methane

Q.—(a) A current of 65,000 cu.ft. per minute is traveling in the return airway of a mine and 3½ percent of this current is methane (CH_4). How many cubic feet of this gas is being generated in the mine and what is the total quantity of the air in the current? (b) Is this percentage of gas dangerous.

A.—As in Illinois, the law requires that in opening a mine, the main shaft shall be set 500 to 2,000 ft. from the escapement shaft, and as shafts are the usual approach to the coal bed in that State, the methane in the return all comes from the mine and is not merely methane in the air that has been recirculated by the fan after reaching the surface. Three and a half percent is 3½ cu.ft. in 100. x:3½::1:00, or x÷3½ =1÷100. Multiply both sides by 3½. Then x=3½÷100=3.5÷100. As there are two zeros in 100 we shift over the 3 and 5 by first moving the decimal to the left of the 3, thus dividing by 10 and then putting a cipher (0) between the decimal and the 3, thus dividing again by 10. In this way the figure becomes .035, or, as we often say to make the matter clearer, 0.035.

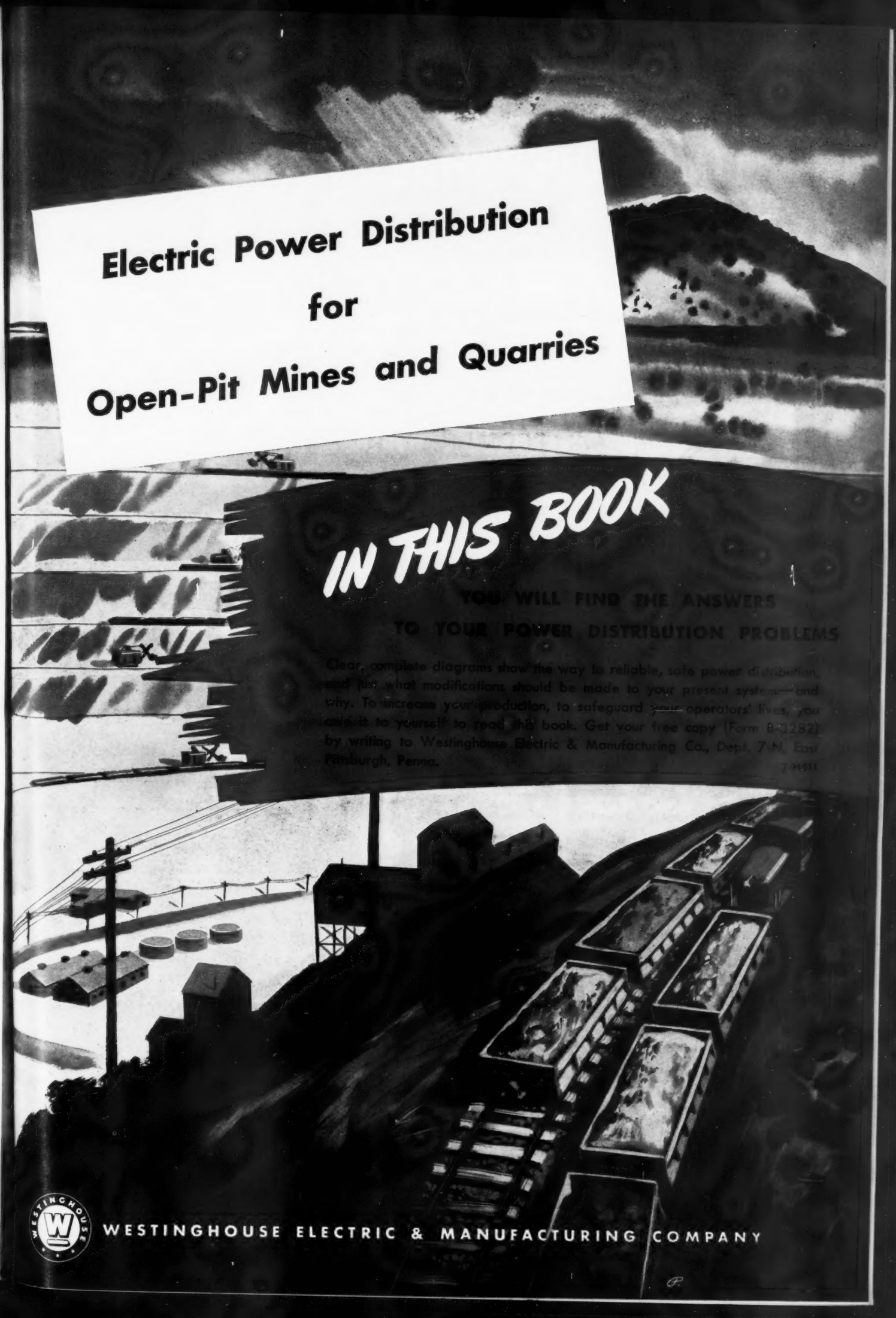
There is 0.035 cu.ft. for every cubic foot of current, so in 65,000 cu.ft. there are 0.035×65,000=2275.000 cu.ft., the three zeros being marked off after multiplication because there are three figures to the right of the decimal in the figure 0.035. Thus the quantity of methane is 2,275. cu.ft. The quantity of air will be 65,000—2275 =62,725 cu.ft. per minute.

(b) This percentage of gas undoubtedly is dangerous and only by extreme caution will an explosion be prevented, no matter how the coal is being mined.

QUANTITIES OF NEON, KRYPTON, XENON AND HELIUM IN SURFACE AIR AS STATED BY SEVERAL AUTHORITIES

	Kingzett* percent	Van Nostrand† percent	Lange§ percent	Colton° percent	Humphreys‡ percent
Neon	0.001,250	0.001,539	0.001,23	0.001,237	0.001,8
Helium	Not stated	Not stated	Very small	0.000,407,6	0.000,5
Krypton	0.000,05	0.000,1	0.000,005	0.000,005	0.000,1
Xenon	0.000,6	0.000,009	0.000,000,588	0.000,000,588	0.000,009

*Kingzett's Chemical Encyclopaedia, April, 1940. †Van Nostrand Scientific Encyclopaedia, 1938. §Lange's Handbook of Chemistry, Sept., 1941. °"Inert Gases and Their Production and Uses," by H. S. Colton, *Chem. & Met.*, Sept., 1937 p. 484. ‡*Scientific Monthly*, 1927.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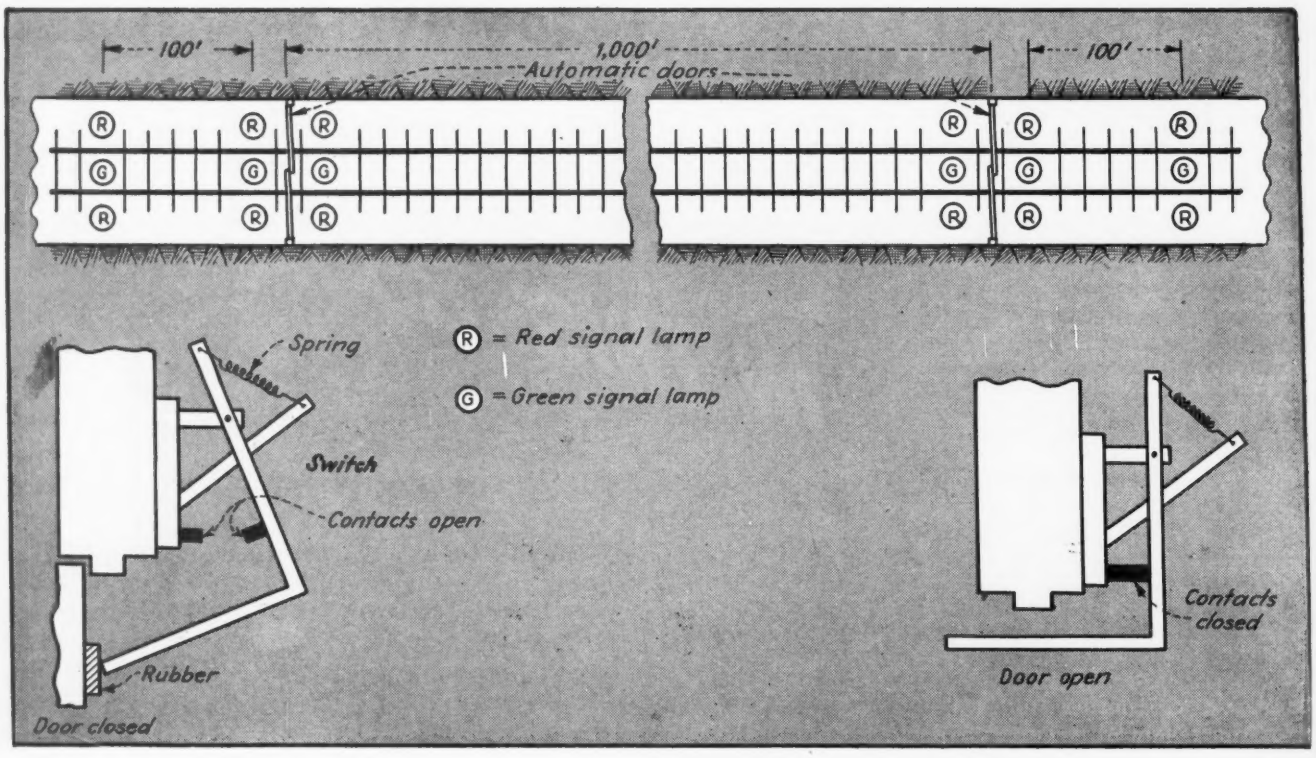
TIMELY OPERATING IDEAS

Signals Stand Guard Over Ventilation



AUTOMATIC SIGNAL LIGHTS control traffic through a 1,000-ft. air-lock on main entry at Powhatan mine of the Powhatan Mining Co., Powhatan, Ohio. Edward Fellabaum, transportation, track and belt foreman, writes that system has been in use more than a year and that now the mine could not afford to be without it.

The arrangement of the system is shown in the accompanying illustration. Automatic doors about 1,000 ft. apart on the main haulage provide an air lock, through which approximately 200 trips must pass each day. Pressure against these doors approaches 5 in. w.g. From the standpoint of mine ventilation alone, it is important that these doors be operated one at a time. Before this system was installed, motormen sometimes had both doors open at the same time. Ventilation was interrupted, dust was stirred up, and even brass checks were blown from the hooks on the cars. It was particularly unpleasant for the mantrips. It took a home-made signal job to restore order.

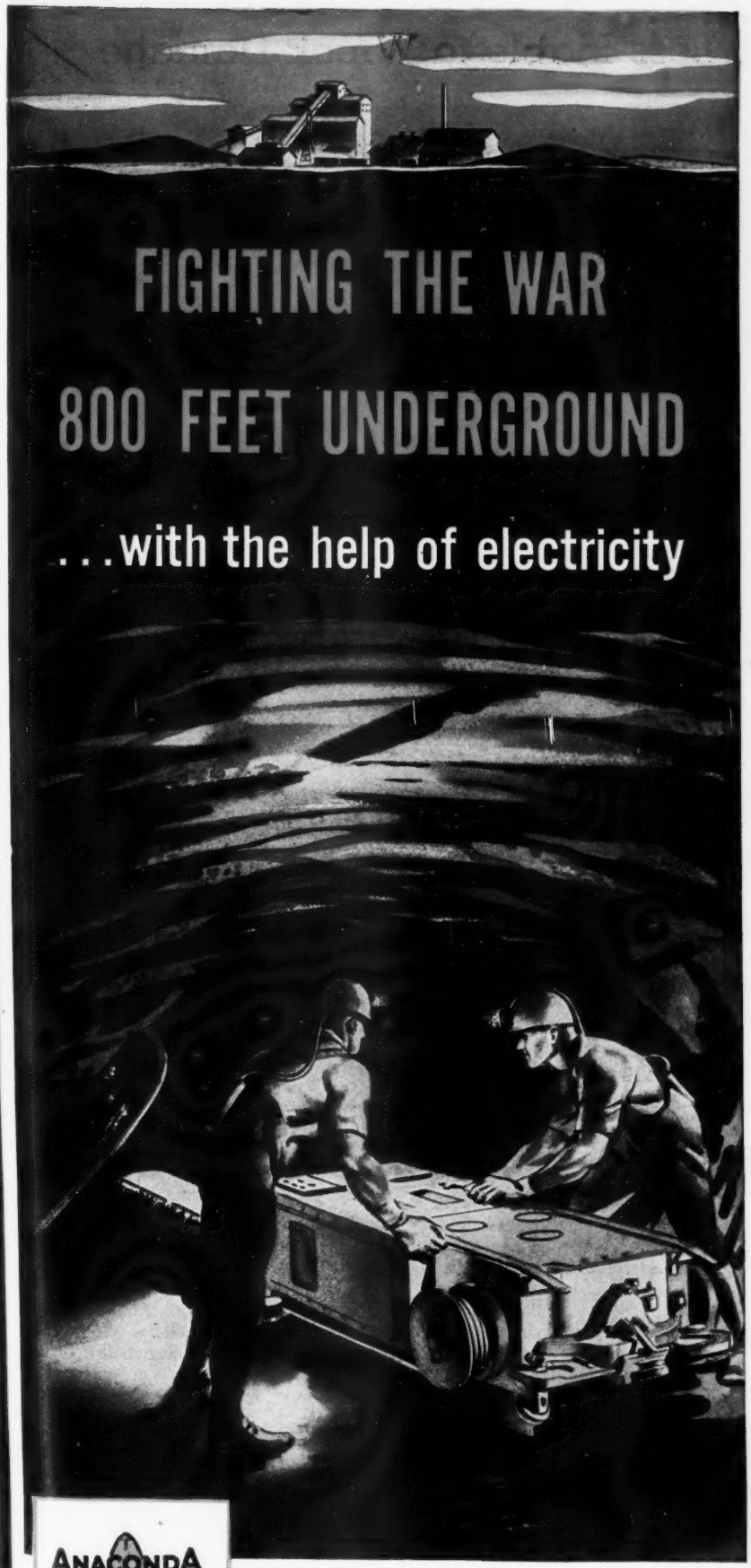
Three banks of lights (each bank consisting of two red and one green lights) were mounted in the vicinity of each automatic door. One bank was placed inside and two banks on a 100-ft. spacing outside each door. Lights so spaced give the motorman ample warning when it becomes necessary to stop the trip.

"At present, when one door is open, the banks of red lights at the other door are lighted, and ample, effective warning is given that the door is not to be opened until the red lights go out and the green is lighted, which happens immediately the other door is closed. These green lights continue to burn so long as the door is closed and cannot burn when the door is open and the red lights are on."

Everything about this signal system is simple and reliable. The switches are actuated by the opening and closing of the automatic doors. Each switch has a single contact with two wire terminals. All parts of the switch are open and grounded. The wiring consists of one two-wire flexible cable between the doors, short pieces of No. 14 wire, sockets and colored bulbs. All wiring is installed on insulators and arranged in good workman-like order.

Stumped?

With war making output goals more important than ever, any obstacle to smooth production not only is annoying but at times may prove a stumbling block. These pages are designed to provide a ready help on such occasions. So if you have a production-boosting, cost-saving electrical, mechanical, operating or safety idea, this is a good place for it. Send it along—with a sketch or photo if it will help make it clearer. For each acceptable idea, Coal Age will pay $5 or more on publication.



In our nation's drive to victory, electrical power and the research-built Anaconda mining cables that carry it are helping vital mine production.

To keep mine production steady, operators use large quantities of electrical power . . . delivered through modern research-built wires and cables like Anaconda's tough, rubber-saving Duracord* and its all-rubber companion, Sunex Securityflex*.

Of particular interest today, with the conservation of rubber all-important, is Duracord. This construction was developed during the last war to meet the need for super-strength cords and cables. Its "fire hose" jacket, woven from long fiber cotton, makes Duracord tough on the outside—the weak spot in most cables.

The Duracord jacket makes possible rubber savings as high as 50% without sacrificing any efficiency. For further information, please write us immediately.

*Reg. U. S. Pat. Off.

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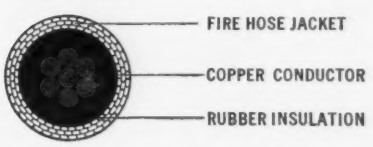
Here's a way you can effectively conserve rubber supplies and still get long-lived heavy duty electrical cords and cables . . . use Duracord.

This construction has served in some places for more than twenty years and it is still in use today. It is *not* a new construction.



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Sunex Securityflex and Duracord

ANACONDA WIRE & CABLE COMPANY

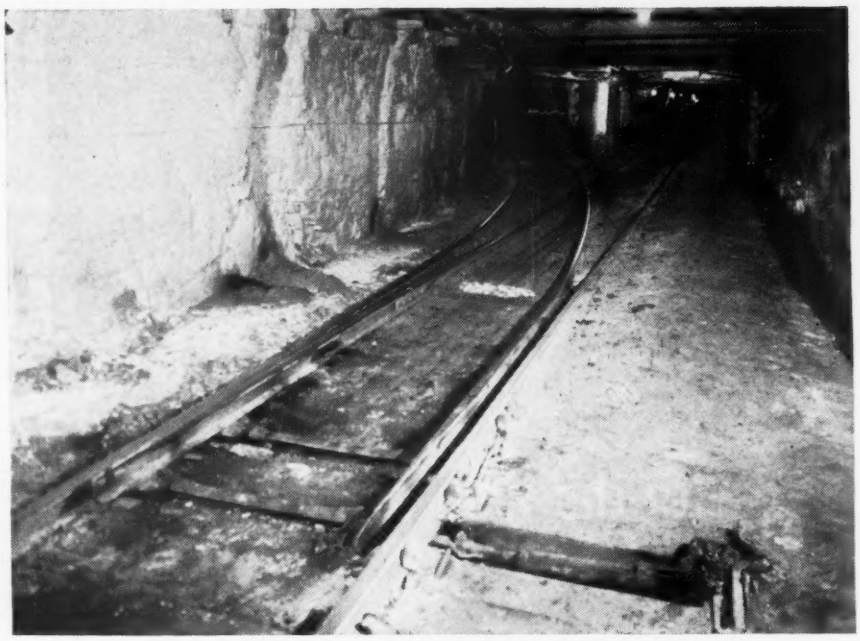
Grouted Switches Less Liable to Wreck Damage

MINE CARS in the Isabella (Pa.) mine of the Weirton Coal Co. weigh 7,760 lb. and carry 10 tons. Although these cars are the eight-wheeled type which stay on the track extremely well, a derailment makes it quite likely, because of the weight, that they will tear up switches. To minimize this possibility a project to grout all main-line switches is under way and nearly completed. Rail weight is 60 lb. or heavier and the track gage 44 in.

Between rails and ribs the grout extends for the full width of the switch, but in the center it is omitted for the length of the points. To do the job the bottom is cleaned rib to rib to about 1 in. below the base of the rails. Then to about rail level the space is filled with a weak cement grout, which is permitted to penetrate the ballast beneath. The use of Lumnite quick-setting cement facilitates getting the job done because it sets so quickly that grooves can be formed next to the rails for flanges without too much dabbling around. If ordinary cement were used, somebody would have to keep molding the flangeways for several hours before they set.

Four methods of switch protection were tried before that final method was adopted. The first trials were with planks 4 in. thick fitted tightly between the rails and for the length of the ties outside of the rails. Because of so much cutting and trimming of this woodwork, the method was very expensive. Another objection, but of less importance, was the gradual uprooting of the planks by locomotive sand and dirt getting under them, thus requiring repairs before there was risk of fouling equipment. This uprooting of the planks took place although they were tied down with 80d. nails to the ties and to each other.

The second experiment was using Amiesite, a paving material consisting of a mixture of stone chips and a carbonaceous binder, but here again the cost was too high and the material so soft and pliable even at mine temperature that it was gouged and heaved too easily.



Switch grouted rib to rib and between rails up to the white line at the heel of the switch points.

Experiment No. 3 consisted of setting the entire turnout in solid concrete clear down to the main floor. This was far too costly and the possibility of rails breaking at the point of change from concrete to normal wood-tie-and-ballast construction proved an actuality.

The fourth experiment consisted of guniting the turnout, and a number of them were protected in this way. That job was easy and quick to install, less expensive than methods tried previously and gave quite satisfactory service. To make the application the ballast and dirt were cleaned out of the track to about 1 in. below the base of the rail and the gunite was allowed to penetrate more or less while being applied to bring the surface practically level with the top of the rail but leaving grooves for the wheel flanges.

The final method—spreading a grout of Lumnite cement—while giving no better service than the above, was still cheaper and was more quickly applied.

Lighting Unit Is Resistor and Two Lamps in Series

Resistor suspended in the line feeding two lamps in series.

TWO LAMPS IN SERIES and a resistor in the circuit constitute the method evolved for d.c. underground lighting in the Isabella (Pa.) mine of the Weirton Coal Co. as a result of war restrictions eliminating the manufacture of the 145-volt lamps formerly used two in series on the 285-volt power. The resistor, rated 200 ohms, 40 watts, cuts the current so that the 50-watt, 120-volt lamps operate on about 95 percent rated voltage.

After the 145-volt lamps were taken off the market three 115-volt lamps in series were tried on the 285-volt circuits, but this cut the voltage on the individual lamps a little lower than desirable. The next step was the present practice of using a resistor and two lamps. This unit, of vitrified type and tubular shape, is connected in the hot line adjacent to one of the weatherproof sockets and supported only by its attachment to the wire. These units were made by the Ohmite Mfg. Co., Chicago, and cost 48c. each.

Because the bulb life with the resistor is proving better than when two bulbs alone were used without resistance, it is likely that the present practice will be continued after the war. Whereas few bulbs, as ordinarily used in mines, burn out on the working shift but many do burn out on the idle shifts, because of higher voltage, the resistor-protected lamps show less of this tendency.

A principal reason for ruling out of use in the Isabella mine of the 250- to 300-volt lamps each connected singly on full trolley voltage is the ever-present danger of blow-ups of sockets in men's hands when screwing bulbs in or out. In seven years in this mine, using series lighting instead, there have been no reports of burns to hands or flashes in the eyes by blowing up of sockets on entry lighting.

Amerclad Single-Conductor Locomotive Gathering Cables. Specially designed for electric mine-locomotives of the gathering-reel type, but suitable for any purpose that requires a flexible single-conductor portable cable to withstand hard usage, acid waters, and operation at high temperatures.

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Even now, when crude rubber is not available and the use of Neoprene is greatly restricted, we have developed synthetic rubber compounds for use in Amerclad Cords and Cables to carry on the old tradition of trouble-free service.

Here's an invitation. Pick out your toughest portable cable job. Next time that cable needs replacement, use Amerclad. Your mine should have the benefit of the time and money-savings that Amerclad insures.

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Safety Board Designed to Get Attention

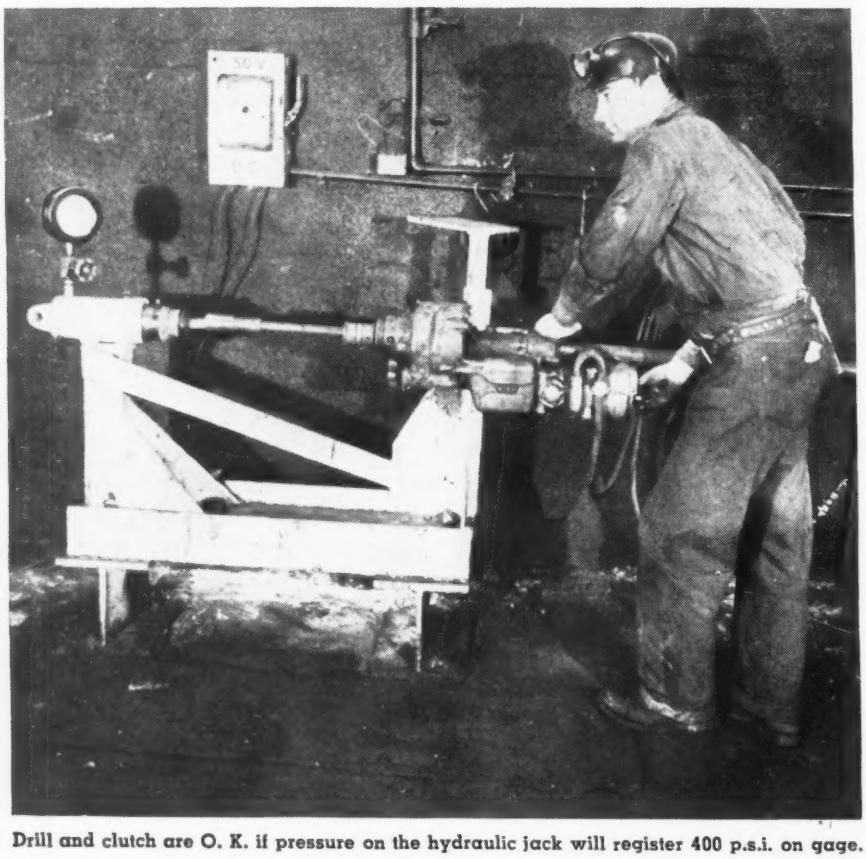
ATTRACTIVE bulletin boards are considered an excellent means of keeping the necessity and desirability of safer working before the men and their direct supervisors. A neat and attractive type of safety board is shown in the accompanying illustration, made recently at Powhatan mine, in eastern Ohio. This board stands beside the bathhouse.

An accurate clock at the top serves every day to draw many an eye to the board. What appears in the illustration as a circle of dots is an assemblage of 31 small electric lamps, normally burning green. Opposite each is a numeral corresponding to the day of the month and pivoted at the center is a pointer which is advanced each morning to point to the current date and lamp.

If one or more lost-time accidents are suffered on any one day, then the green lamp opposite that numeral is replaced with a red one and it burns red for the remainder of the month. The two large charts on each side of the center show the accident performance by months to date for the current year and subdivided for each of the three shifts of each section or gang. At the center bottom is a chart of total lost-time accidents per month and compared to months in the previous year. Bulletins in the center frame are changed weekly.

"Safety here, safety there, safety pays everywhere."

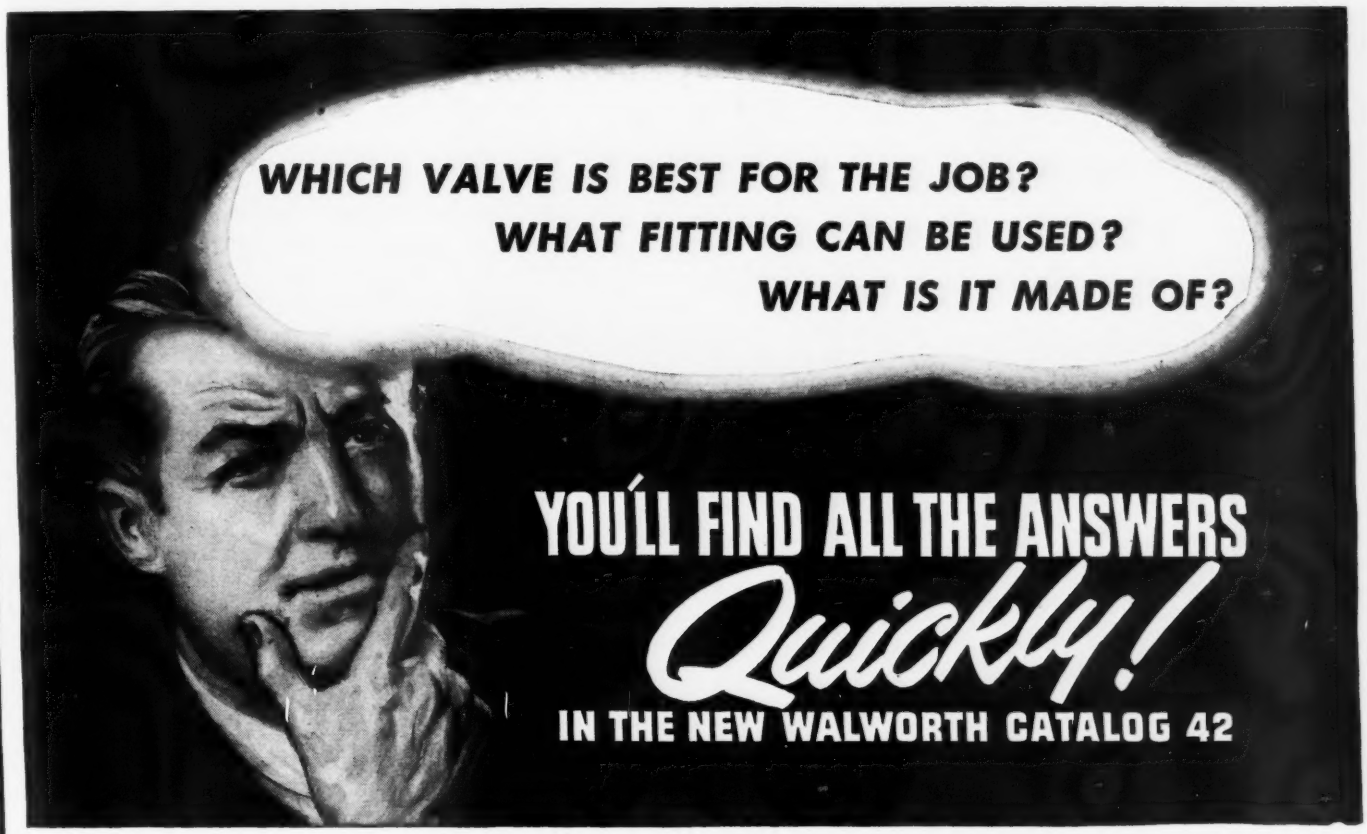
Drills Repaired and Tested on Combination Bench



Drill and clutch are O. K. if pressure on the hydraulic jack will register 400 p.s.i. on gage.

AFTER A SHOP REPAIR JOB a machine should be given a running test, be it a motor, a mechanical unit or a complete electrically driven machine. Though the usual light load test is satisfactory for many items, a load test on others is a practical necessity to insure that the trouble has been located and the job done right. For example, the shops of all larger operations are equipped with stands for making load tests on pumps, valves, pistons and motors of hydraulic systems of face machines. To remove uncertainty in repairing another item of face equipment—the electric coal drill—officials of the Weirton Coal Co. have equipped the undeground shop of the Isabella (Pa.) mine with a combination work bench and test stand.

The position in which the drill, a Jeffrey A-6 permissible post unit, is clamped for the repair job is the same as that in which it is tested; thus there is no handling in between. For the test the thread bar is forced against a thrust bearing backed by a hydraulic jack that once served on the boom of a Whaley Automat loader. A dial gage connected at the rear end of the jack registers the pressure exerted on the thread bar by the clutch, and a unit which will bring the gage to 400 p.s.i. has a clutch which is satisfactory for service. Running light, one of these drills takes about 3 amp. (operating on 285 volts d.c.), and when showing 400 p.s.i. on the gage, about 22 amp.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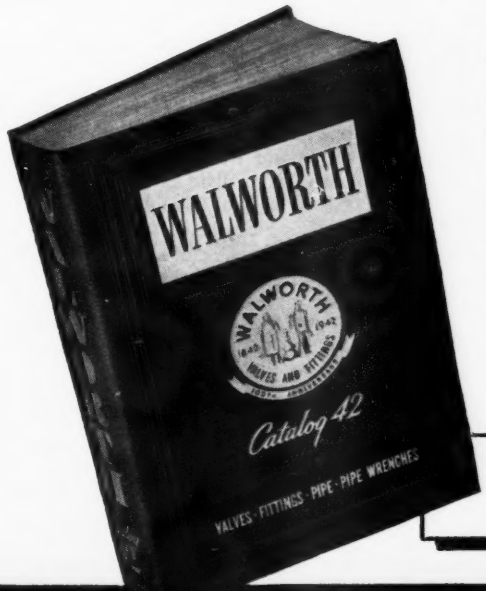

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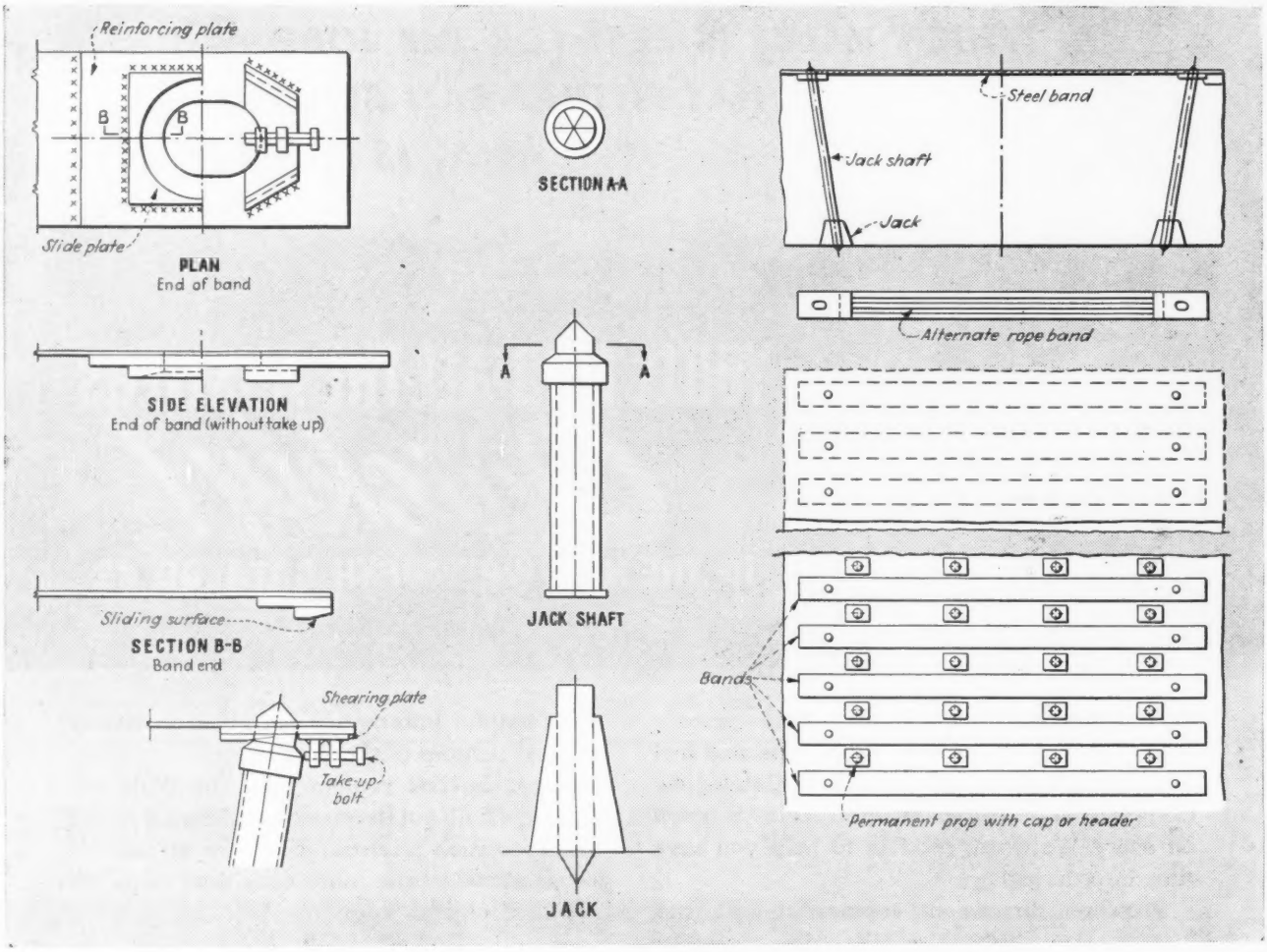


How band-type roof support is made and used for greater safety in face work.

USE OF STEEL or wire-rope bands on jacks to reduce the hazard of falls of roof is proposed by O. S. Batten, civil and mining engineer, Pikeville, Ky., who presented the details at the Big Sandy-Elkhorn Mining Institute meeting, at Pikeville, Jan. 28.

The fact that about 40 percent of all fatalities due to roof falls occur at the working face prompted Mr. Batten to develop the new method of supporting the roof to reduce this figure. However, he point out that this device is not intended to supplant any of the permanent methods of timbering now in use; rather is it a form of temporary support for local protection in the immediate vicinity of the face. It will not prevent the initial sagging of roof or keep pieces from coming loose, a condition often encountered. Instead, its primary purpose is to keep the dislocated or loose pieces of coal and slate from falling on men and equipment at the working face.

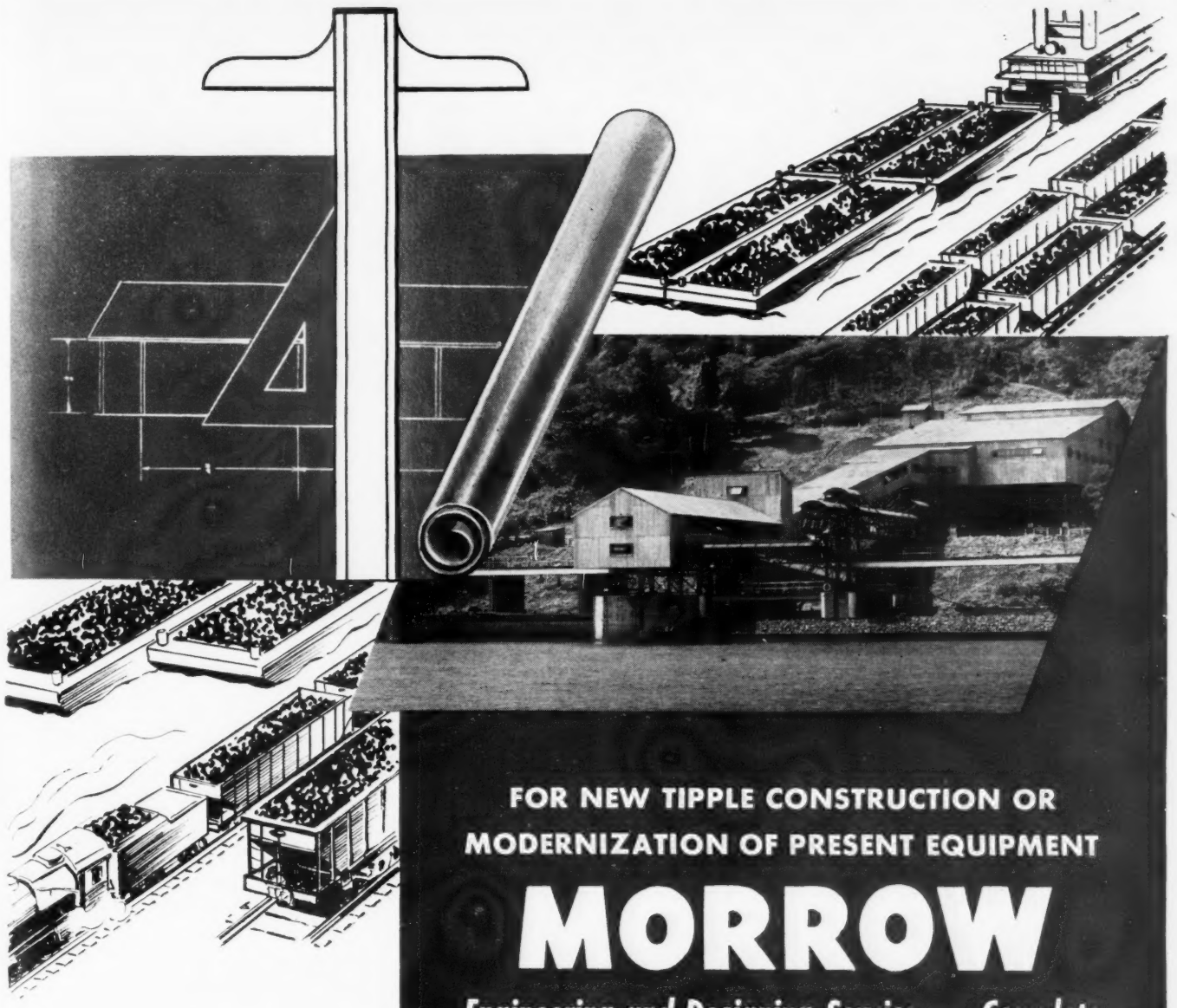
Primarily, the device consists of a thin steel or wire-rope band stretched (with some sag) against the roof and held in place by anchor jacks at each end. The working area in one room or entry would be protected by a series of such units, installed with gaps between to accommodate the permanent timbering as soon as the working area has been advanced. Thus the cycle of operation would be placing the desired number of individual bands after the working place had been cleaned up, followed by posting or installation of other permanent timber and removal of the bands for re-installation in a new cut to keep pace with the advancement of the face operation.

The bands are installed only sufficiently tight to put them against the top and protect men and equipment. In such condition, they can sag a certain distance in the center and thus take a much heavier load than if pre-stressed. The support includes a shearing plate to permit such sag when a load comes on.

A steel band ¼ in. x 12 in. wide, with length to suit the width of the working face, is suggested. An alternate would be a band made up of a number of ⅜-in. ropes to facilitate handling and erection. Use of high-strength alloys naturally is indicated to reduce weight and labor for setting. As indicated in the accompanying illustration, welding plays an important role in the fabrication of this device. A reinforcing plate welded directly to the band, at either end, serves to distribute the stresses. To the outside half of each reinforcing plate two angles are welded diagonally. These support a ½-in. plate carrying a take-up screw, this additional assembly being the "safety plug" which shears to permit the band to sag after sufficient load has been imposed by a loosening of the top coal or slate. The slide plate directly across from the "safety plug" facilitates the slipping action necessary to afford more sag to the band.

Each anchor jack consists of a jack shaft (made in lengths to suit various working heights), an elevating jack, and suitable points to anchor the top and bottom of the complete assembly.

The advantage of the band method of support, Mr. Batten points out, lies in the fact that it provides a wide-open working face for mechanical equipment. The advent of mechanical equipment, especially in thin coal, brought considerable interference with timbering as formerly done, with the result that the tendency was to neglect the timber. Finally, says Mr. Batten, "this device is especially adaptable to loading terminals and room necks where proper timbering often is a difficult problem."



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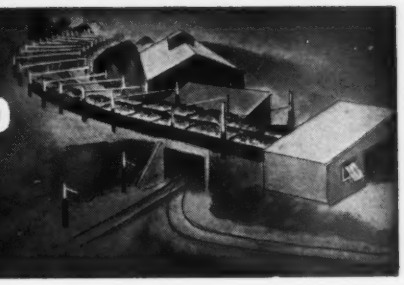
COAL AGE NEWS ROUND-UP



Authorities Work to Increase Coal Supply

Additional Distribution Regulations Adopted in February to Increase Supplies —Others Modified or Relaxed—Sunday Anthracite Work Yields Substantial Tonnage

WITH unloading at destination becoming a more critical factor in some areas, additional regulations were issued during February to facilitate coal distribution. At the same time, certain others were modified or relaxed. Several major price relief orders were issued by OPA, while WPB announced that it was opposed to coupon rationing of coal. Sunday work in the anthracite region resulted in an appreciable increase in hard-coal supplies. These and other major developments in the fuel picture are summarized in the following material.

Sunday Hard-Coal Output Encouraging—Response to the Ickes order of Jan. 29 directing anthracite mines to work Sundays in February was heartening, with 46,000, or 64 percent, of the normal working force of 73,000 reporting for work the first Sunday, Feb. 6; production totaling 131,000 tons, or about 58 percent of normal daily output, and 173 collieries of 218 on the government list operating. The second Sunday, Feb. 13, showed a distinct improvement, with 53,000 men at work, 184 mines operating and 163,000 tons produced. Most of those not working, it was said, were older men, physically unable to put in a seven-day week. On Feb. 20, with 50,500 men at work in 196 collieries, 150,000 tons was produced.

Prompt Unloading of Cars Urged—The Office of Defense Transportation, by appeal and enactment, urged expedition in unloading cars during the last month. Calling attention to the request that anthracite miners work on Sundays in February and with a limited number of cars, ODT said Feb. 7 that it was imperative that unloading be speeded up, though it might mean working unloading forces on Saturday or Sunday. To ease growing tightness in supply of open-tops, ODT announced Feb. 11 that, effective Feb. 20, no-bill ratings of hard-coal mines would be reduced from 75 to 50 percent of rated capacity. A further appeal to *all* receivers of coal to unload coal cars as fast as possible was issued Feb. 15, sporadic shortages of cars having been aggravated, it was said, by a cold wave in northern areas.

Limiting of Anthracite Shipments Modified—SFAW Revised Regulation No. 11, issued Feb. 5, modified the ban on shipments of anthracite for domestic use west of the Pennsylvania-Ohio line to permit half the normal quantity to flow during February and March for use by consumers unable to utilize substitute fuels. Retailers receiving such fuel under the modified control are directed to give preference in distributing it to consumers requiring hard coal for space-heating base burners, magazine-type heaters or boilers, anthracite stokers, bakeries and poultry brooders and hatcheries. The revision also eliminates a ban on westward shipments into Canada, allowing coal to flow to Canadian communities between Lakes Erie and Huron rating as part of the normal primary eastern anthracite market.

Government Deals in Anthracite Slack—A program for making available to industrial soft-coal users large tonnages of steam sizes of anthracite was announced by SFA Feb. 23. The program is designed to (1) relieve a huge and growing surplus of industrial sizes of anthracite unsuited for domestic use that threatens to cut vitally needed production of domestic sizes unless new markets can be found; (2) supplement the available supply of industrial sizes of soft coals in order to help meet growing needs of war plants and other industries. Surplus anthracite is being purchased by the Defense Supplies Corp. and marketed by SFA first to persons who will accept it voluntarily. If sufficient tonnages cannot be moved in this manner, it may become necessary to ship it, instead of bituminous coals, to industrial plants that can use it and that ask SFA for emergency help to relieve fuel shortages. Surplus coal purchased by DSC that cannot be marketed immediately by SFA will be stockpiled wherever facilities convenient to transportation can be arranged.

The National Coal Association terms this a significant development, pointing out that similar tactics could be applied to bituminous coal for which no immediate market is available. The consequences of government stockpiling, if it materializes on a large scale, may be far-reaching.

Advisory Groups to Aid Emergency Distribution—A plan to establish regional and local volunteer organizations to be known as SFA Area Advisory Committees on Local Distribution and SFA Community Committees on Emergency Distribution was disclosed in an announcement Feb. 24. Composed largely of coal dealers, they are to be available to mobilize area and local coal and coke distribution facilities when necessary. The committees are to foresee threatening shortages, arrange with SFA for emergency shipments, ascertain which dealers and/or consumers are actually in need of preferential deliveries, give assistance in spring and summer distribution programs of SFA to build consumer and dealer fuel stocks. An SFA National Advisory Committee on Local Distribution also is to be created to consult with and make representations to Secretary Ickes. Basis for establishment of the new committee system is provided for in SFA Order 12.

To Consider Miner Deferment—To help relieve the shortage of manpower at coal mines the War Manpower Commission, Coal Mines Administration, SFA and others have initiated action resulting in a statement from WMC that "grave consideration for occupational classification will be extended to Selective Service registrants engaged in coal mining in all areas where labor conditions warrant." Announced plans of WMC include intensive recruitment drives for miners and prospective miners by the U. S. Employment service; efforts to improve utilization of manpower in the mines; establishment of miner-training schools and provision of housing facilities where necessary.

PAPER IS VITAL

Like steel and rubber, paper finds direct use on the battle front, in the manufacture of war material and in essential civilian activities at home. The supply is short. The need for conservation is great. Save paper to promote the war effort. Use as little as possible and make that little go as far as possible. And when paper is used as much as possible, see that it is salvaged for other war service.

Concerned Over Shrinking Reserves—Secretary Ickes expressed concern Feb. 7 because consumers' bituminous coal stocks had dropped to an average of 30 days' supply on Jan. 1 and probably had fallen still lower. SFA figures revealed that soft-coal consumption in December was 15.7 percent greater than in November and that consumers used 3,387,000 tons more than the mines produced in the last month of 1943. On Dec. 1, 1943, stockpiles stood at 60,079,000 tons, or an average of about 36 days' supply at the consumption rate then current, but had shrunk to 56,692,000 tons, or 30 days' supply, a year later.

Engineer and Coordinators Named—Secretary Ickes announced Jan. 31 appointment of a district engineer and eight more coordinators as the Bureau of Mines prepared to carry its fuel efficiency program into metropolitan industrial and commercial plants. With thousands of volunteer regional engineers enrolled and 12 coordinators named to direct their work in large industrial centers, organization of the campaign to minimize waste in fuel is well under way. Part of the government's critical resources conservation campaign, the program, directed by the National Fuel Efficiency Council, in cooperation with the Bureau of Mines, is to be expanded to include the small consumer. John G. Mingle, Bureau of Mines, has been named district engineer at Indianapolis, Ind., whence he will supervise the program in Michigan, Ohio, Kentucky and Indiana. The new coordinators are: Merrill F. Blankin, president, American Society of Heating and Ventilating Engineers, Philadelphia, Pa.; Edward L. Crosby, Henry Adams Co., Baltimore, Md.; P. W. Thompson, vice-president in charge of engineering, Detroit Edison Co., Detroit, Mich.; William G. Christy, smoke abatement engineer, Hudson County Board of Health and Vital Statistics, Jersey City, N. J.; Sam Dalton, Dalton Coal & Material Co., Columbia, Mo.; F. K. Prosser, coal traffic manager, Norfolk & Western Ry., Roanoke, Va.; Albert L. Maillard, Military Chemical Works, Pittsburg, Kan., and Linn Helander, head, mechanical engineering department, Kansas State College, Manhattan, Kan.

Shipments Subject to Reconsignment—Provision is made by Regulation 14, issued Feb. 5 by SFA, that shipments and distribution of solid fuels by producers and wholesalers may be made hereafter only on condition that they be subject to possible reconsignment, diversion or rerouting in transit to meet emergency fuel needs. Diversion of heavy shipments of domestic coal from southern Appalachian bituminous mines to meet acute shortages in seven Southeastern States were to be discontinued Feb. 17, Secretary Ickes announced. Sufficient coal has been diverted to avert distress in the Southeast, he said, and Reg. No. 13 has been amended to provide a normal flow of coal to the North and Midwest as well as the Southwest. A provision requiring certain mines to make 5 percent of their lump and double-screened coals available for emergency diversion to critical areas was retained and extended to cover all mines in southern West Virginia, eastern Kentucky, part of Virginia and part of Tennessee.

COMING MEETINGS

- **Canadian Institute of Mining and Metallurgy: annual meeting March 20 and 21, Royal York Hotel, Toronto, Ont., Can.**
- **Virginia Coal Operators' Association: annual meeting, April 8, Norton, Va.**
- **Midwest Power Conference: annual meeting, April 13 and 14, Palmer House, Chicago.**
- **Mine Inspectors' Institute of America: annual meeting, June 5 and 6, Daniel Boone Hotel, Charleston, W. Va.**
- **Rocky Mountain Coal Mining Institute: annual meeting, June 8-10, Cosmopolitan Hotel, Denver, Colo.**
- **Illinois Mining Institute: annual summer meeting and boat trip, June 9-11, aboard Str. "Golden Eagle," from St. Louis.**

Alabama Coals Boosted in Price—OPA has authorized an increase of 9c. a ton on Alabama coals in addition to the 10c. allowed in November following the Ickes-Lewis wage agreement. OPA said the advance was made because of an error in the original computation.

Commercial Price Set on Locomotive Coal—Producers of several sizes of coals in different areas have been authorized by OPA in Amendments Nos. 86 and 89 to M. P. R. 120 to sell to railroads at ceilings for commercial coal instead of those for railroad fuel. These changes were granted because, railroad fuel rates being lower, the coals were being diverted from the carriers. The roads affected are those served by District No. 4 (Ohio) and two roads from District No. 8. Amendment No. 88 permits mines in Illinois to charge locomotive-fuel ceiling prices for coal in seven size groups produced for other uses.

Rise in Stoker Screenings Allowed—Increase in ceiling prices for stoker screenings are allowed in Districts 1, 3–8 by Amendment 82 to M. P. R. 120, issued Feb. 2, if the producer has been directed by SFA to increase output of double screened coals; if the coals are derived from rescreening resultant coals; if the extra production requires a change in the mine's normal screening practices.

Inventory Lull on Oil Front—To ease the tight fuel-oil situation on the East Coast, Administrator Ickes instituted on Feb. 16 a 10-day inventory restriction. Amendment 4 to Petroleum Administrative Order No. 1 in effect provides that East Coast consumers using fuel oil in other than private dwellings may not accept delivery of additional supplies if their tanks already contain enough to satisfy normal seasonal withdrawals during the ensuing ten days.

•

Research Program Studied at Battelle

Ways in which the bituminous coal industry, in its new $500,000 research program, can advance the use of pulverized coal were discussed at a meeting of the committee on industrial utilization of the technical advisory board of Bituminous Coal Research, Inc., with representatives of the manufacturers of pulverized-coal equipment held at Battelle Memorial Institute, Columbus, Ohio.

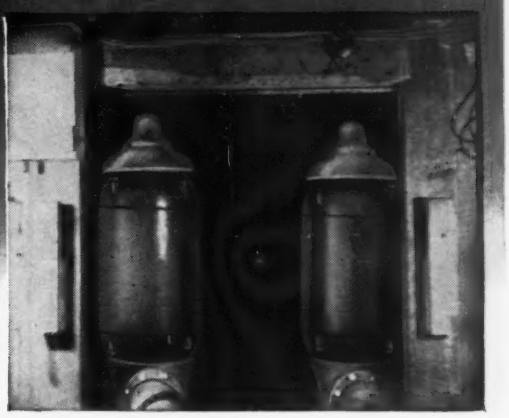
Subjects discussed were: abrasion index for metals in contact with moving coal and coal ash, the relation of surface and inherent moisture in coal to its grindability, the mechanism of combustion, rate of

"The white ones are diamonds; the black ones are genuine anthracite."

What Pomona advantages mean on YOUR pumping operations!

Mine records show Pomonas pump *more* water . . . at *lower* cost . . . with *less* upkeep

Performance records kept by operators themselves prove beyond question that Pomonas are not only cheaper pumps to *buy* per year of service, but also cheaper to operate, cheaper to maintain. Among the many reasons for Pomona's outstanding performance records, the following are typical . . .



THESE TWO POMONA PUMPS installed at the Little Ben Mine in Montana give some idea of the unusual compactness of Pomonas. Each of these pumps is a 40 H.P. 3 stage 12" pump with a capacity of 1150 gpm against a head of 150 feet. Yet the two pumps together occupy only a very small space—about 6 by 3 feet—with plenty of room between for maximum convenience and working space.

Pomonas are famous throughout the mining world for their ability to fit into shoe-horn spaces like this . . . small shaftways and waste corners too cramped for other-type pumps. And for adaptability, you can't beat them. The same pump that does your mine dewatering can be quickly converted to a deep well pump for primary water supply . . . or to shaft sinking work . . . or to a circulating pump for your mill. *Pomona Pumps are never idle!*

▶ Because of compact *vertical* design, Pomonas require as little as 1/5th the plant space of other-type pumps . . . often even less, because their simple foundation requirements permit mounting in waste space directly *over* tanks, sumps, etc., instead of taking up space alongside.

▶ Pomona's unique semi-open impellers are readily adjustable to meet varying requirements of water flow, *with proportionate savings in power.* Eliminates wasteful throttling! Pomona's exclusive bulb-shaped vanes smooth fluid flow, minimize turbulence, conserve energy. Efficiencies 90% and higher are being obtained with Pomonas, even against varying heads and with fluctuating water levels.

▶ Because ALL bearings below the motor head are fully lubricated *by the water being pumped,* there is no risk of contaminating the water or your equipment with oil film. No oil or grease tubes to leak or require maintenance.

▶ In Pomonas the motor is *above* water level—safe, convenient—and the pump *below* water level where it requires no priming. Eliminates costly "dry pits" or expensive priming equipment. Also permits fully automatic operation without pump damage.

These are only a few of the many important **Pomona** *advantages that mean vital savings on* **your** *water pumping operations. Pomona capacities range from 15 to 300,000 gpm and higher. There's one to cut costs on* **your** *job. Write for detailed literature!*

POMONA PUMP DIVISION
JOSHUA HENDY IRON WORKS
POMONA, CALIFORNIA

POMONA PUMPS — Oceans of Water

Pomona Products

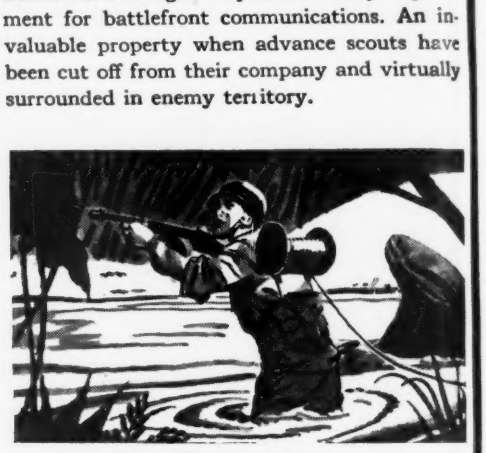
DEEP WELL PUMPS

NIAGARA PUMPS

MINE PUMPS

LITTLE CHIEF PUMPS

TALKING DISTANCE...OVER 5 MILES... Laytex Assault Wire assures clear, sure transmission of messages—a prime military requirement for battlefront communications. An invaluable property when advance scouts have been cut off from their company and virtually surrounded in enemy territory.



LAYTEX ASSAULT WIRE IS LIGHTWEIGHT ...*and fully dependable.* One man carries enough wire to keep communications open—travels fast and far without being hampered by excess, needless weight.

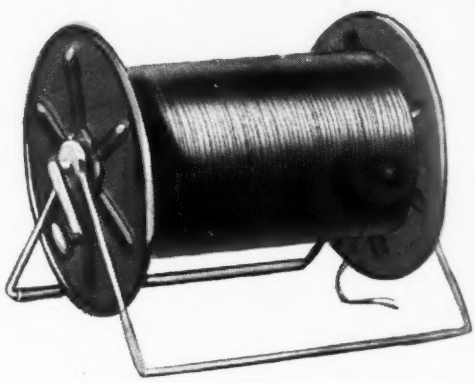
JUNGLE DAMP'S A KILLER

The jungle's a dirty fighter. Vines and underbrush seem to grow across your way while you watch them. The sun doesn't get through...and it's damp. The heavy, hot kind of damp that means mildew and decay to every piece of equipment not specially made or treated to resist them.

Laytex Assault Wire is specially made to resist damp. The high quality, uniform insulation is entirely free from water-soluble elements. It is unaffected by prolonged exposure to moisture, provides maximum protection to the accurately centered conductors.

Not only that...the special Laytex Insulation has high resistance to concussion and does not become embrittled when wire is subjected to repeated vibration and shock. It readily withstands temperature changes. Its uniformly high quality permits the thickness of the insulation to be kept at the minimum. As a result, Laytex Assault Wire is extremely lightweight. A mile weighs less than 30 pounds. Laytex Assault Wire has a talking distance of better than 5 miles, and was developed for front line service by United States Rubber Company scientists working in close cooperation with engineers of the Army Signal Corps.

These same properties—light weight, small diameter, ability to withstand temperature changes, flexibility and toughness make other types of Laytex Wires and Cables as important in peacetime industry and building as they are to the Armed Forces.



Laytex

ASSAULT WIRE

SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

1230 Sixth Avenue, Rockefeller Center, New York 20, New York

flame propagation, fundamentals of flow of coal and air in pipes, effect of recirculation of flue gases on combustion, fusion of coal ash, and radiation from flames. More information is needed on these subjects, it was agreed, to improve firing equipment.

Consideration was given also to extension of the uses of pulverized coal into non-steam uses where oil and natural gas have largely supplanted coal, such as in the open-hearth furnace; cement, lime and brick kilns; railroad locomotives and the gas turbine. Some work by B.C.R. already under way or completed on forge furnaces and radiant-tube furnaces was described.

To continue the cooperation demonstrated at this meeting and to work up a definite program from the many good suggestions offered, a committee representing the manufacturers was named. The members are Ollison Craig, Riley Stoker Co.; J. E. Crites, and R. M. Hardgrove, Babcock & Wilcox Co.

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Foreign Oil Field Entered by U. S.

Developments on the oil front during the last month were highlighted by the entrance of the United States Government into oil transportation in the Near East and the arrival at Norris City, Ill., of the first refined products moving north through the War Emergency Pipelines, Inc., 20-in. line from Beaumont, Texas.

Harold L. Ickes, Secretary of the Interior and president of the Petroleum Reserve Corp., functioning as an agency of the U. S. Government in foreign petroleum affairs, announced the pipeline plans Feb. 4, which include construction of a 1,250-mile pipeline from the Persian Gulf, on the eastern shore of Saudi Arabia, to the eastern end of the Mediterranean Sea. Signers of the agreement on principles, besides Mr. Ickes, were F. A. Davies, president, Arabian American Oil Co.; J. F. Drake, president, Gulf Oil Corp.; W. S. S. Rodgers, president, Texas Co., and H. D. Collier, president, Standard Oil Co. of California. The cost of the project was estimated at $130,000,000 to $165,000,000.

Adopted text of agreement on principles between Petroleum Reserves Corp. and Arabian American Oil Co. and Gulf Exploration Co. provides:

1. Government to construct, own and maintain trunk pipeline from a point near present oil fields of Saudi Arabia and Kuwait to eastern Mediterranean port.

2. Companies to return cost to government in 25 years.

3. Companies to maintain a crude-oil reserve of 1,000,000,000 bbl. or 20 percent of recoverable reserves if fields prove to have reserves of less than 5,000,000,00 bbl. for purchase by U. S. military services.

4. Government shall have right to acquire these reserves over a period of 50 years at a rate, if desired, of as much as 30,000,000 bbl. per year, or greater on reasonable notice, at 25 percent less than going price in Persian Gulf area or the United States, whichever is lower.

5. In addition, in time of war, government has option to purchase all of companies' output.

6. Sales to other nationals to be restricted when it would militate against United States interests.

The United States can no longer depend on domestic oil wells for all the petroleum it needs, and must turn elsewhere for additional supplies, President Roosevelt said at a press conference Feb. 11. The nation needs petroleum from outside for this war if it keeps on going, and for the future, he added.

Edward R. Stettinius Jr., acting Secretary of State, told his press conference that the United States Government is going to talk over oil matters with the British, and said the discussions would center on Near Eastern areas where the British and Americans among the Allies have a primary interest.

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New Tax Bill Affects Coal Industry

Several sections of concern to the coal industry are included in the new tax law which Congress passed over the President's veto. The bill became law Feb. 25, when the Senate overrode the executive veto by a vote of 72 to 14 the day following similar action by the House by a 299 to 95 vote.

Besides allowing some special credit against excess profits taxes for coal mines coming into production since 1939 the new law defines "gross income from the property" for purposes of percentage depletion. The latter is contained in Sec. 124(c), which provides:

"(B) Definition of Gross Income From Property.—As used in this paragraph, the term 'gross income from the property' means the gross income from mining. The term 'mining,' as used herein, shall be considered to include not merely the extraction of the ores or minerals from the ground but also the ordinary treatment processes normally applied by mine owners or operators in order to obtain the commercially marketable mineral product or products. The term 'ordinary treatment processes,' as used herein, shall include the following: (i) in the case of coal—cleaning, breaking, sizing, and loading for shipment...The principles of this subparagraph shall also be applicable in determining gross income attributable to mining for the purposes of Secs. 731 and 735."

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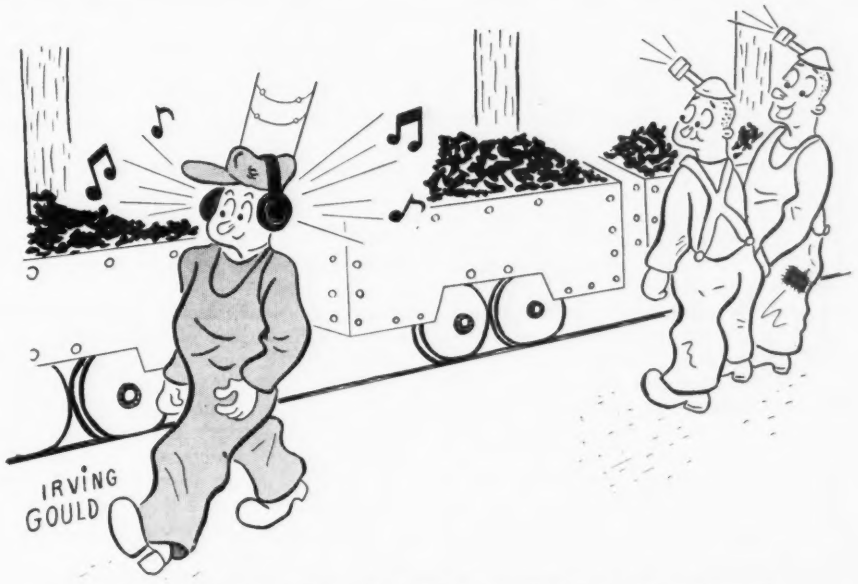
Action Awaited On Bootleg Injunctions

Final action still is to be taken in a number of injunction actions against bootleg miners in the Pennsylvania anthracite region. In Schuylkill County, an injunction granted Jan. 31 has been continued in force pending a hearing, which was in turn postponed at the request of counsel for the defense. In Northumberland County, the Susquehanna Collieries Co., acting on a 1937 injunction, complained that 13 free-lance miners had violated the order. The court ordered the sheriff to bring in the accused to face charges of contempt of court.

Judge H. W. Cummings, in Northumberland County Court Feb. 17, refused to dismiss a temporary injunction against 34 independent miners and directed their counsel to restrain them from operating coal holes on Philadelphia & Reading Coal & Iron Co. property. The court said the miners could present their case at the final hearing, to be scheduled after their answer was filed.

Counsel for the miners, John L. Pipa Jr., argued the company acted in bad faith in instituting the suit at a time when the country needs all the coal that can be produced. The attorney asked dismissal of the temporary injunction after three detectives testified for the company that mine property was posted with "no trespassing" signs and individual miners had been warned to cease operations.



"I thought they were ear muffs until he installed that radio antenna!"

A.I.M.E. Discusses Coal Production and Use

Anthracite and Bituminous Developments in Mining, Preparation, Safety, Utilization and Combustion Featured at New York Meet

WITH a larger registration than ever before, the Coal Division, American Institute of Mining and Metallurgical Engineers, at seven sessions in the Waldorf-Astoria, New York, Feb. 21–23, proceeded under six heads—anthracite, preparation, safety, mining, utilization and combustion—to receive and discuss 21 papers.

In the last six months of 1942, asserted Walter Lutz for himself and J. T. Griffiths, Hudson Coal Co., that company handled 38.8 tons of water for every ton of coal mined, yet only 24.06 in. of rain fell in Scranton and vicinity in that time, only 4.35 in. more than the average for that district. In 1942, 30.3 tons of water was pumped for every ton mined. In 1920 the ratio was 8.4. Of the water that fell, 88 percent went into the mines. If it were not for huge sumps the $800,000 spent for pumping plants would have to be increased to $2,208,000.

Supplementing these remarks, C. J. Golden, for himself and Vaughan Wilson, also Hudson Coal Co. men, detailed how cracks in a stream bed which was admitting water to the mines were sealed by sand and bituminous filling followed by a mud coating which was itself protected by a small dam (see *Coal Age*, December, 1943, p. 68).

Enough anthracite is present in the world, mostly in China, declared Allen J. Johnson, Anthracite Industries, Inc., to last 10,000 years at the present rate of consumption, but the classification of coals varies from country to country and some of the coals dubbed "anthracite" might not satisfy our American definition. Meta-anthracite is found in the 1,000-square mile Narragansett field of Rhode Island. It ranges from anthracite to graphite. It may have only 2 percent of moisture as it leaves the mine, but hauled around on a foggy day it will gain about 15 percent of water. It is being mined for foundry facings and furnace linings, so resistant is it to fire.

The Pittsburgh seam, asserted D. H. Davis, Pittsburgh Coal Co., for himself and John Griffen, McNally-Pittsburg Mfg. Co., has supplied in the several years from 1937 to 1941 from 12 to 15 percent of the total bituminous tonnage of the United States and 15 percent of the value of the coal at the mine, also 32 to 37 percent of the coal tonnage used for byproduct coke and 50 to 85 percent of the tonnage used for beehive coke. The American Society for Testing Materials specifies that coke should contain not more than 1.3 percent sulphur, and coke used in both acid open-hearth and bessemer process should not exceed 0.01 percent phosphorus, all of which phosphorus passes from coal to coke and thence enters still undiminished in quantity into the iron. But where water transportation is available 1.5 percent sulphur in coking coal may be regarded as equal in value to coal having 1.2 percent of sulphur.

Ash percentage increases with fineness at the Lansford pilot flotation plant, declared W. J. Parton, for himself and C. D. Rubert, Lehigh Navigation Coal Co., ranging from 12.5 percent for 14x20-mesh coal to 43.26 percent for minus 200 mesh. The fine coal not only is not worth saving but further interferes with efficient flotation. With cells in series, the first cell produces 2.29 tons per hour, and the second 0.54, with the seventh 0.02 tons per hour, the ash in the first being 11.49 and in the last 45.45 percent. In the final arrangement the feed was passed in parallel through two cell groups, each consisting of two cells in series. The dilute pulp was then taken to a thickener, reducing pulp volume; thus less cell capacity and less reagent were required for a given recovery in the four cells through which it was then passed in series. Coal recovery is 85 percent of feed. Ash percentage is 12.78.

Cardox, asserted E. C. Skinner, Pittsburgh Coal Co., has done much to prevent the excessive breakage of coal. He presented a table to exemplify this:

SIZE CONSIST OBTAINED WITH CARDOX COAL BREAKING

Size, In.	*Powder*	*Cardox*
6	9	17
4x6	9	10
2x4	18	19
1x2	20	18
—1	44	36

A British film showing good methods of stoking Lancashire boilers and principles of the combustion of furnace gases was presented with comments by H. F. Hebley, Pittsburgh Coal Co.

Stimulated by insurance credits, safety hats are being used by 22,600 employees, or 63 percent, of those companies covered by the coal-mine rating schedule, stated C. E. Berner, Pennsylvania Compensation Rating and Inspection Bureau. Safety goggles are used by 28 percent, or 10,000 employees, and safety shoes by 44 percent, or 15,800 employees, but many use these safety devices in mines not fully equipped and thus not credited with a lowered insurance rate and given no place on the record.

Statistics show, declared H. P. Greenwald, U. S. Bureau of Mines, that 10.2 percent of the mines in 1941 were using rock dust, comprising 57.1 of the nation's coal tonnage and employing 49.6 percent of the mine workers and operating 52.0 percent of the man-hours. The big mines are the most active rock-dusters. Federal inspections in District A show that only 24 of 332 mines are completely and adequately rockdusted.

The gist of the paper of Dan Harrington, U. S. Bureau of Mines, was a plea for less coal dust and more sprinkling, though sprinkling will fail in a frozen intake, as at Dawson, N. M., in 1923, where the frost had continued for at least five days. Coal miners have less lung disease than those in metal mines because ventilation is better. Coal dust is responsible for two-thirds of the loss from mine explosions in the United States, yet probably more coal workers die each year from respiratory diseases caused by such dust than die from explosions thus occasioned, said Mr. Harrington.

Raymond Mancha, Jeffrey Mfg. Co., as chairman, Ventilation Committee, Coal Division, quoted letters from Carel Robinson, consulting engineer, and Dr. Cloyd M. Smith, editor *Mechanization*, in favor of use of auxiliary fans, and by T. G. Fear, Hanna Coal Co., and E. H. Denny, U. S. Bureau of Mines, condemning their use. Discussion was somewhat equally balanced. When moving forward per shift five cuts each of 5 ft., said L. E. Young, consulting engineer, the movement is so rapid that some better way than line brattice should be found and provided of carrying air to the face.

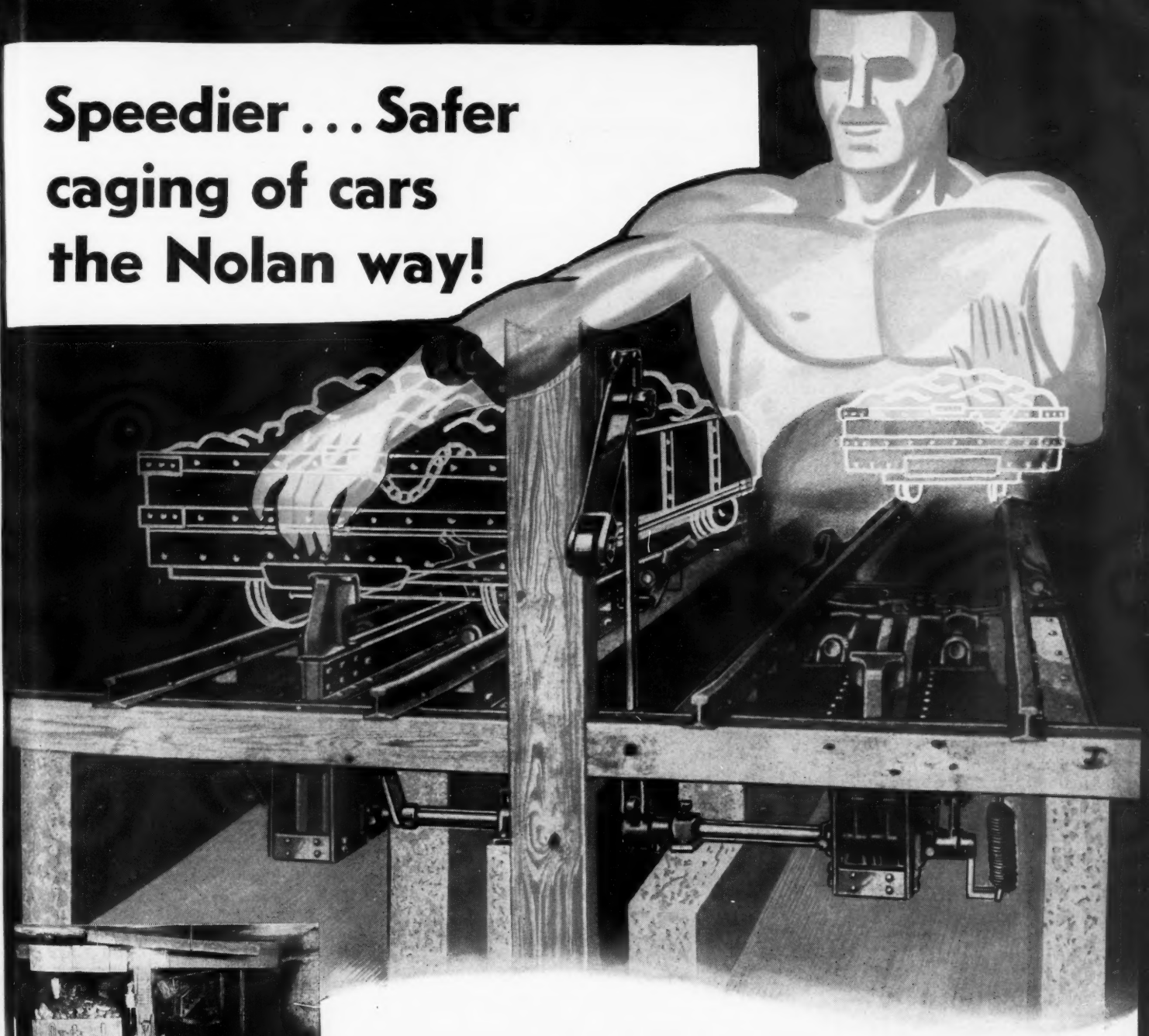
Neither a line nor a staff set-up will serve the purpose of management, in the opinion of W. W. Beddow, Logan County Coal Corp., as conveyed by D. P. Morton. The set-up must be molded to suit the several individual capabilities of the officials. A superintendent who lists too many objectives may find his foreman choosing the easy tasks he outlines and neglecting the harder ones. He should choose the first things first, for man-hours are limited, and should be careful not to take a hand-me-down system from another mine, for at his own mine it might not fit.

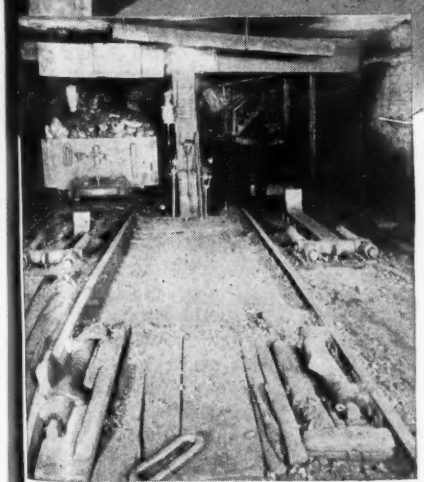
The relative virtues of battery and cable-reel shuttle-car haulage were discussed by M. J. Hrebar, Pennsylvania State College, who said that first cost, replacement, maintenance and move-up costs were greater with battery shuttle-car haulage than with cable-reel haulage. More dead weight, lower pay load and more power were characteristics of such haulage, and batteries have to be charged, but flexibility of battery cars is greater. They can go almost anywhere. Battery power is safer as cables, with their fire and ignition hazards, electrocutions and burns, are eliminated.

B. H. Mott, Mott Core Drilling Co., described the method of using core drill-holes to ascertain the nature of water drainage in the measure, so that such holes can be used for pressure grouting with cement mixtures in which clay and/or organic material complete and control the seal.

Seeking to find ways of servicing any consumer who is in trouble, they soon found, revealed C. H. Sawyer, Koppers Co., reading a paper of which Walter Knox was co-author, that design of stoker

Speedier . . . Safer caging of cars the Nolan way!





The Nolan Patented Automatic Bumper Stop Cager was developed to automatically and rapidly handle mine cars to hoisting cages and dumps without damage to car. Cars are stopped by engagement with the car bumpers which are designed for just this type of service. For rapid gravity caging, heavy grades are necessary so that the car caged, enters with sufficient force to push the empty from the cage and to assume its position for hoisting with a minimum time lag. To withstand the shock of this rapid handling, cars must be caged by caging units properly cushioned and constructed to avoid damage to the car and to themselves. Nolan Bumper Stop Cages have proven their ability to withstand the heaviest service.

Use Patented Nolan Automatic Cushioned Bumper Stop Cagers

● You have a right to expect the finest possible caging service from Nolan units, for they are built around exclusive Nolan patents and improvements, by the most experienced mechanics in the business.

Nolan Cagers are working in hundreds of mines throughout the country, rapidly and automatically handling mine cars to hoisting cages without damage to car wheels, journals and axles. And these cagers work with the same care and efficiency in dump operations.

War demands for coal in industry and home require smooth-running, trouble-free, high-speed production at every point in your mine. Don't let bottlenecks at shaft bottoms or dumping points handicap *your* output. Nolan Car Caging Equipment easily handles loaded cars with clock-like precision, hour after hour, year after year, without delay or waste motion.

Write for complete information on Nolan Rotary or Gravity Car Dumpers, Trip Feeders, Car Hauls, Automatic Cagers, Platform and Self-Dumping Cages, and Cushioned Car Stops.

NOLAN

THE MINING SAFETY DEVICE CO.

★ *BOWERSTON, OHIO* ★

outweighs all other factors in improving coke formation in the domestic stoker. Insufficient air causes the coal to form large blocky coke masses, though raising air above 30 to 40 percent excess (based on steady running) does not cause the coke trees to break and fall.

Wetted-down coal is more harmful by far than calcium chloride, which latter does not seriously shorten stoker life. Sodium dichromate, used for neutralization, increases the corrosion of coal equipment. However, if the temperature is raised to 350 deg., hydrochloric acid forms and the corrosive action of calcium chloride is rapid.

Mixing coals for coking by volume does not give satisfactory results, is the experience of B. P. Mulcahy, Citizens Gas & Coke Utility. It is his practice to weigh the constituents. Formerly, the mix was correct within 8 percent; now 2 percent accuracy is obtainable. To get good foundry coke of uniform blocky size, uniformity is needed in the coal as well as in conditions of treatment. Mine officials should blend their coal so as to have a uniform product, not only as to ash, sulphur and phosphorus content, but also as to coking and expansion qualities.

Perhaps the most responsive coal to hydrogenation should not be subjected to that treatment, declared A. C. Fieldner, for himself and H. H. Storch, U. S. Bureau of Mines. Remoteness of high-grade coals and the need of the public to maintain as long as possible its coking coal reserves may favor use of the sub-bituminous coals of the West. In figuring yields, all soluble matter obtained is rated with the oils.

Anthracite gives less than a 70 percent yield; low-volatile bituminous, 70 to 90; medium-volatile, 75 to 95; bituminous high-volatile and subbituminous, 85 to 96; lignite, 90 to 97; bright coal below medium volatile, 85 to 97; splint and semisplint, 65 to 85; cannel and bogheads, 70 to 98; translucent anthraxylon, translucent attritus, spore exines and algae remains, 95 to 98; resins, 98 to 100; opaque attritus, 40 to 80; and fusain, 10 to 90. Yields given always should be halved because power and water-gas demands, etc., reduce the net result to that degree.

Low-temperature char by the Hayes process is being used successfully as a substitute for low-volatile coal in the formation of coke, and at the coke-oven plants of the Colorado Fuel & Iron Co. give much better results than can be obtained with Pocahontas coal, declared G. V. Woody, Allis-Chalmers Mfg. Co., for himself and the senior author J. D. Price, of the coal company. Furnace temperature for coking is 1450 deg. F.; length of process, 20 minutes; and volatile content, 19 percent.

William Lawrence Saunders medallist, George Bates Harrington, president, Chicago, Wilmington & Franklin Coal Co., Chicago, Ill.

Coal has been fighting a rear-guard action since the last World War, asserted C. E. Lesher, Pittsburgh Coal Carbonization Co.; a guerrilla warfare with sniping within the ranks is giving way to combination for research.

Sulphur content of one coal prepared for metallurgical use now never deviates from the average more than 0.07 percent in the raw coal and 0.03 in the washed; before blending, 0.15 deviations were common. This was part of a statement in a paper by A. L. Toenges and L. A. Turnbull, U. S. Bureau of Mines. Deviation at another mine has been 0.7 and now is 0.05. Elsewhere, some parts of the seam are rejected; in others suitable coal is produced for metallurgical use and inferior coal for steam and other purposes, but, in some cases, blending of coals from all areas results in a suitable product.

At the banquet, the William Lawrence Saunders Medal "for distinguished achievement in mining" was presented to George Bates Harrington, president, Chicago Wilmington & Franklin Coal Co.

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Big Sandy Elects

Meeting in Pikeville, Ky., Feb. 25, the Big Sandy-Elkhorn Coal Mining Institute elected officers. With G. M. Patterson, chief, Kentucky Division of Mines and Minerals, a leading speaker, the meeting stressed safety in mining operations and bronze plaques were presented to operations with the best safety records. South-East Coal Co. mines at Seco and Millstone, Ky., received plaques for perfect safety records. Lapel buttons were presented to these mine foremen: W. A. Pack, G. C. Billips and Ernest Collins, all of the Inland Steel Co., Wheelwright, Ky., and Jack A. McConn, Utilities Elkhorn Coal Co., Esco.

J. E. Green, Utilities Elkhorn, Esco, was named president of the institute, succeeding M. K. Reed. Vice-presidents are V. D. Pickleshimer, South-east Coal Co., Seco; Edgar Dale, Elk Horn Coal Corp., Wayland, Ky., and M. M. McCormick, Consolidation Coal Co., Van Lear, Ky. A. D. Sisk was reelected secretary-treasurer.

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Again Ask Pay Boost For Bosses-Clerks

A plea for reopening of the case and reconsideration by the National War Labor Board of its denial of authorization to make blanket increases in wages of certain supervisory and clerical employees on a percentage basis equivalent to one hour's pay per day was filed Feb. 10 with the Board by the petitioners in the original case: operators' negotiating committee, Appalachian Joint Conference; operators' negotiating committee, Southern Appalachian Joint Wage Conference; and Central Pennsylvania Coal Producers' Association.

The petition concluded with an expression of "the hope that you will reverse your position and authorize us to correct the inequalities created by your approval of the Ickes-Lewis agreement and the approval of the Treasury Department to adjust the wages of the supervisory force."

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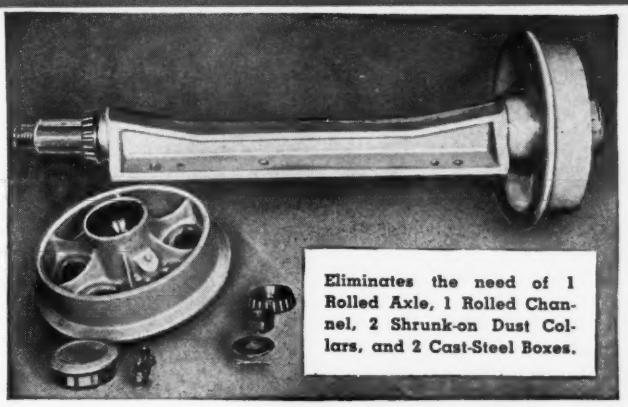
Synthetic Oil Plants Voted Funds

Legislation authorizing the government to build and operate three experimental plants to produce synthetic gasoline from coal, shale and other products was approved Feb. 16 by the House of Representatives at Washington by a vote of 140 to 13. Passage followed promptly after Representative Jennings Randolph (D., W. Va.) sponsor of the bill, read a letter from Petroleum Administrator Ickes advising that the Army and Navy favor the undertaking of a synthetic fuel program without delay.

Representative Randolph said the plants would cost about $30,000,000 and that about three to four years will be required to get them in operation. They are not designed primarily as war plants. Mr. Randolph said the measure does not contemplate placing the government in competition with the oil industry but would provide private operators with the necessary cost and engineering data for development of a synthetic industry. The industry, he added, favors the measure.

EXPENDITURES FOR RESEARCH

Institution	Appropriation
U. S. Bureau of Mines	$400,000 exclusive of mine safety and explosives
Battelle Memorial Institute	80,000 Bituminous Coal Research
Carnegie Institute of Technology	75,000 Half from coal operators
Pennsylvania State College	30,000 Coal operators
Illinois State Geological Survey	100,000 State of Illinois
	$685,000



Eliminates the need of 1 Rolled Axle, 1 Rolled Channel, 2 Shrunk-on Dust Collars, and 2 Cast-Steel Boxes.

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•

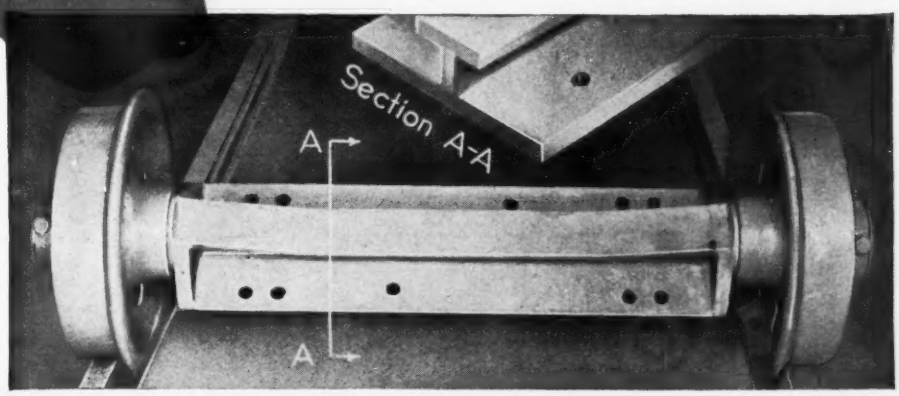
CAST STEEL WHEELS

★ With treads cast to an accuracy almost equal to a machined surface. The quick, dependable, low-cost way to build your own mine cars in your own shops—with the DUNCAN Integral-Cast Steel Axle and cast steel Wheels.

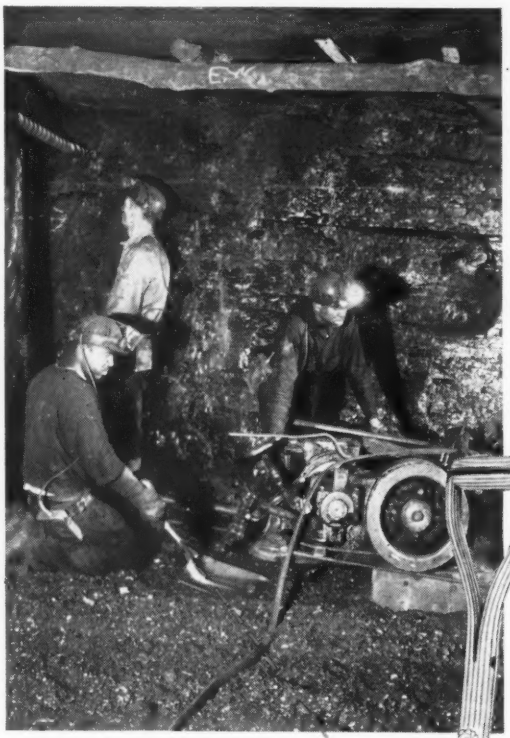
Careful controlled chemical properties and proper heat-treating make DUNCAN Integral-Cast Steel Axles equal in strength to a rolled axle. They weigh 125 lbs. and replace 225 lbs. of weight. The following results were obtained by placing two axles in hydraulic press, each bolted flat on face of press and bent to a 30° angle on each end of axle—CAST AXLE . . . 225 tons—ROLLED AXLE . . . 200 tons—neither axle showing a sign of fracture.

Cast axles have been used for years on automotive trucks and trailers to a great satisfaction. Investigate today and see how you can use them to great benefit—let us tell you how mines can save money, time, and materials with DUNCAN Integral-Cast Steel Axles and cast steel wheels.

DUNCAN FOUNDRY & MACHINE WORKS, INC., ALTON, ILLINOIS



"THE FIRST WORD IN CONSTRUCTION .....THE LAST WORD IN WEAR!"



"Big Fist" Brand Coal Shovels are the very *first word in construction* . . . designed to meet the exact requirements of experienced coal miners...equipped with exclusive features developed by WOOD and found only in WOOD made Shovels.

"Big Fist" Brand Coal Shovels are the *last word in wear*... blades made of special analysis alloy steel . . . XX grade handles of specially selected, thoroughly seasoned timber . . . reinforced with the steel I-Beam . . . an exclusive extra-wear feature.

● This brand on the handle means *extra* wear in the Shovel.

THE STEEL I-BEAM HANDLE REINFORCEMENT

The finest exclusive extra-service feature found in shovels.

WOOD SHOVEL AND TOOL COMPANY

PIQUA, OHIO

A NATIONAL ORGANIZATION SPECIALIZING EXCLUSIVELY IN SHOVELS, SPADES AND SCOOPS

Your Electric Motor Requirements

The day of trying to use a standard motor for a special job is about over.

Machinery designers, and production managers have learned that it is much more efficient and economical to obtain a motor with exactly the electrical and mechanical characteristics required to perform a specific job than it is to try to doctor up a standard "shelf" motor to do the job.

Speed and horsepower are no longer the major measuring stick of motor requirements—they are merely incidental to the many other characteristics available in electric motors today.

For over forty years we have been developing special motors for special jobs—our engineering department has a wealth of experience along this line—

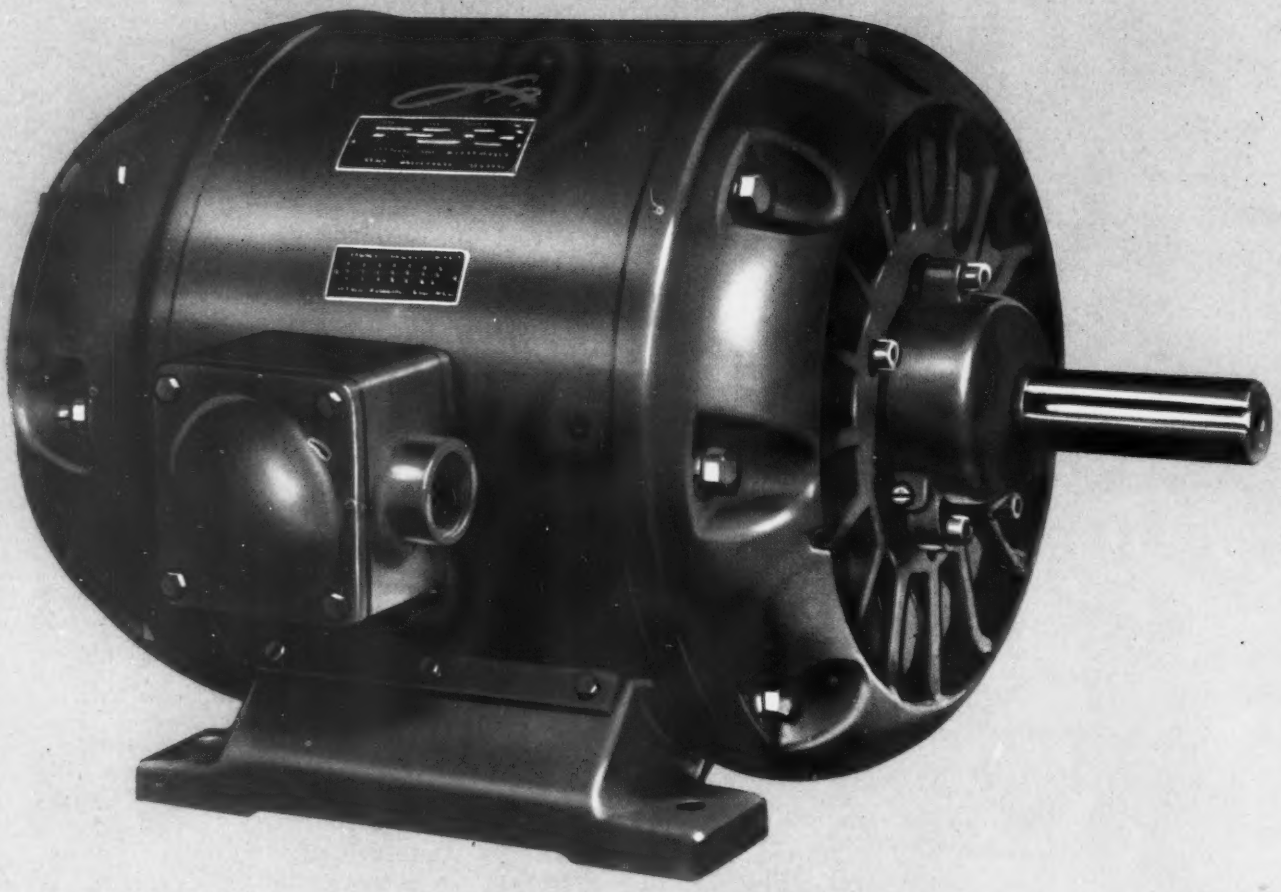
* * *

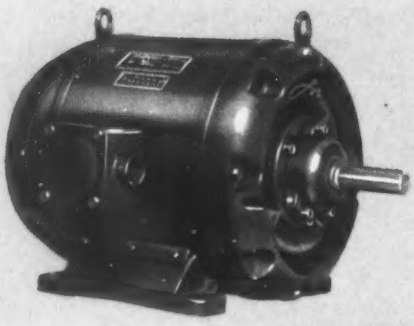
Our engineering development department has created many outstanding — perhaps revolutionary — improvements in electric motor design, construction and performance that are now playing an important role in helping win this war.

Many of these important new motor developments will also play an important role in the post-war period.

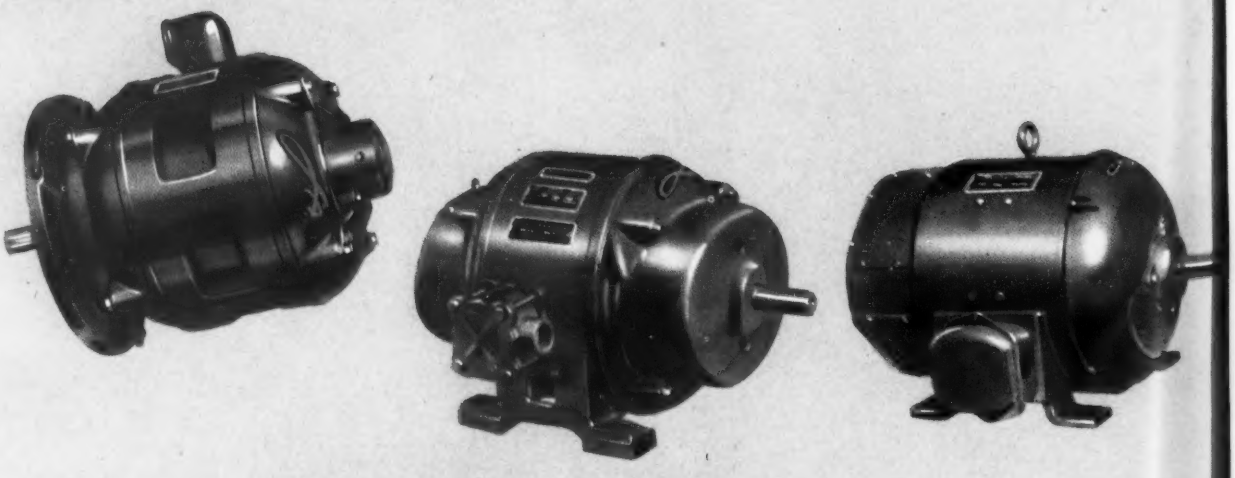
Our engineering development department will welcome the opportunity of discussing your post-war electric motor problems with you.

THE LOUIS ALLIS CO., MILWAUKEE 7, WIS.





There is a size and type **LOUIS ALLIS** *electric motor for every industrial requirement.*



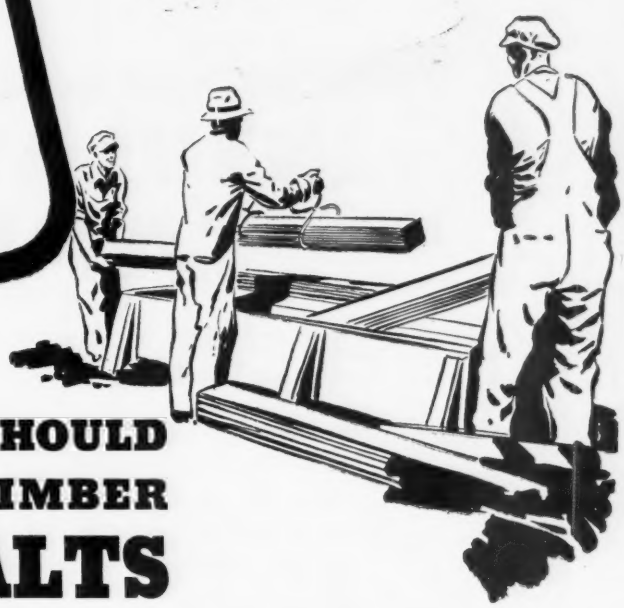
THE LOUIS ALLIS CO., MILWAUKEE 7, WIS.

1 **LOWER COST...** because you use native green timber.

2 **LOWER COST...** because handling and transportation costs are greatly reduced.

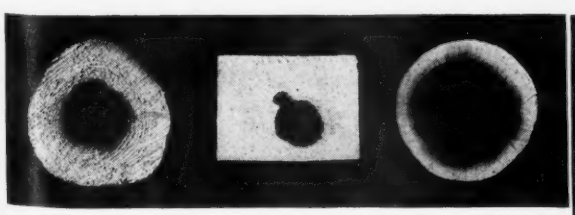
3 **LOWER COST...** because no special, expensive equipment or heating apparatus is needed.

4 **LOWER COST...** because it can be applied with any unskilled labor.



4 REASONS WHY YOU SHOULD TREAT YOUR OWN TIMBER WITH OSMOSALTS

Those four reasons will save you a lot of money and headaches. This is not idle statement, but the proven experience of mines which are successfully treating their timbers with OSMOSALTS. Generally their source of supply is standing timber on their own property. In addition to the savings effected, they obtain dry, clean, odorless treated timbers which are safe and easy to handle. Write today for all the facts.



Illustrated above are cross sections of three kinds of timbers. The white outer areas, which have been subjected to standard color reagent tests, show the deep penetration of the toxic chemicals in Osmosalts.

OSMOSALTS

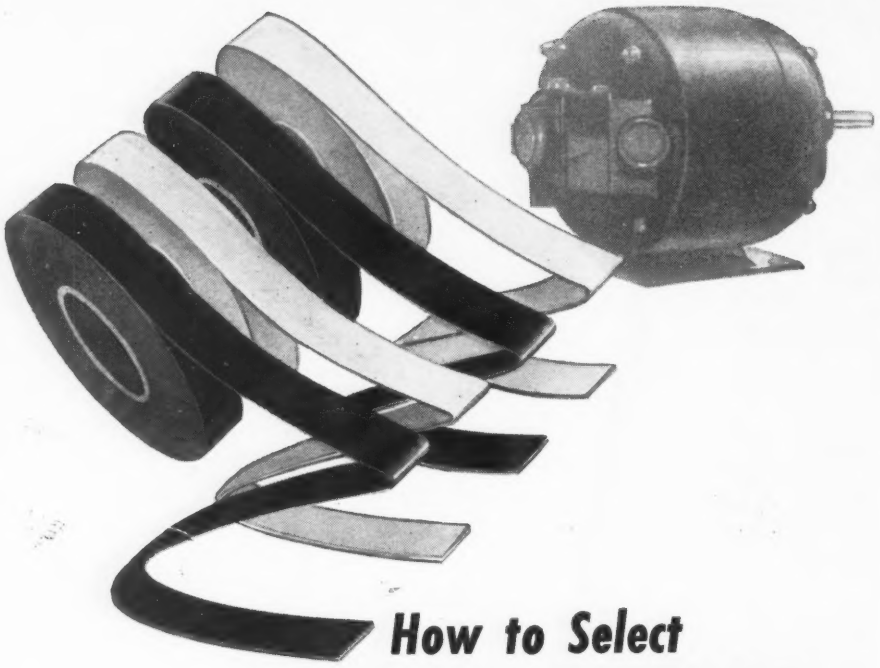
Nature's Method of Wood Preservation

MANUFACTURED BY

OSMOSE WOOD PRESERVING COMPANY OF AMERICA, INC.

GENERAL OFFICES: BUFFALO 12, N. Y.

BRANCH AND SALES OFFICES: BIRMINGHAM 3, ALA.; DENVER 2, COLO.; KENOVA, W. VA.; HARLAN, KY.; MT. VERNON, ILL.



How to Select
INSULATING
TAPES

Here are three factors to remember when selecting insulating tape:

A. The base cloth must: (1) have ample mechanical strength; (2) be chemically inert; (3) contain minimum sizing to permit thorough penetration by the insulating varnish and prevent weakening of the fiber in service.

B. The varnish must: (1) be neutral in relation to the cloth; (2) impart maximum dielectric strength, flexibility and resistance to heat, oil, water or other damaging agent against which the particular tape is to give protection.

C. A ready source of supply for all types of insulating tapes must be available. Your local G-E distributor handles a complete line of tapes, as well as all other insulating materials, and can furnish detailed data on request. Or send for catalog to Section M342-10, Resin and Insulation Materials Division, General Electric Company, Schenectady, N. Y.

GENERAL ELECTRIC

Mine Travel Time Above Agreed Norm

A national weighted average of 55.29 minutes' daily travel time in bituminous coal mines is revealed by returns tabulated to Jan. 31 in a progress report submitted to President Roosevelt Feb. 3 by a portal-to-portal committee. The committee, consisting of Morris L. Cook (chairman), R. L. Ireland Jr., president, Hanna Coal Co., and Thomas Kennedy, secretary-treasurer, United Mine Workers, based its figures on returns covering 141,000 U.M.W. members working inside 1,000 mines producing about 63 percent of the underground-mined soft coal.

Latest returns, said the committee, "seem to be running somewhat ahead of this average and returns from many of the older and larger mines have not been received. It therefore seems probable that the final figure will be somewhat higher. Travel time for individuals range from below 5 minutes to 3 hours and 3 minutes. The weighted average to date for the northern Appalachian area is 59.17 minutes and for the southern Appalachian area 52.78 minutes." The committee suggested that making of a final report be postponed for a few weeks.

Travel time has been reduced in recent weeks, according to the report, which said that "the proposal to measure it and the possibility of having it paid for in wages appears to operate automatically to reduce it."

Percentage of volume coverage for the eight largest producing areas, having a total output of about 85 percent of the coal produced at underground mines by U.M.W. members, and their weighted travel time is shown by the committee as follows:

District	Percent Volume Coverage	Travel Time Min.
8 Southern No. 2	85.18	52.18
4 Ohio	77.00	56.62
2 Western Penna.	70.67	61.24
3 Northern W. Va.	62.83	55.79
13 Alabama	59.40	57.27
7 Southern No. 1	58.75	54.07
1 Eastern Penna.	45.26	55.07
10 Illinois	3.63	48.96

•

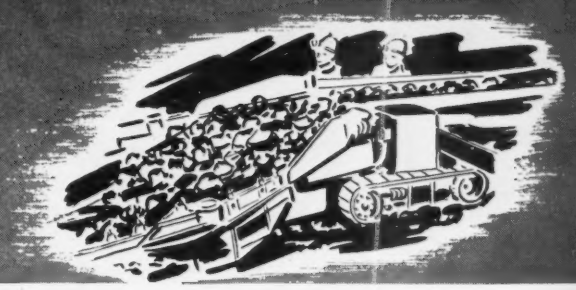
Kentucky Bill Asks 10c. Ton Tax on Coal

R. M. Hall (D.), Walton, introduced a bill Feb. 3 in the Kentucky House of the State Legislature providing for a 10c. per ton tax on coal produced in the State. Representative Hall pointed out that, as about 65,000,000 tons of coal is produced annually in the State, the measure would yield an annual income of about $6,500,000.

G. Moss Patterson, head of the State Department of Mines and Mining, said such a bill would kill Kentucky's peacetime coal production, as in normal times 85 to 90 percent of its coal output is shipped out of the State, and that the impost would make it impossible for Kentucky mines to compete with producers operating without such a tax.

Sam Caddy, Lexington, Ky., president, District 30, United Mine Workers, also

HOW TO TEST MINE LOADER LUBRICANTS



3 Here's why you should test Superla Mine Loader Lubricants

● EVERY REASON why you should not close the door on a test of mine loader lubricants is also a reason *for* testing Superla Mine Loader Lubricants.

1. New lubricant developments. Superla Mine Loader Lubricants are comparatively new. Very recently three grades have been added to the Superla line. Now, six thickened oils are available to take care of practically every loader lubrication requirement. Uses are described in detail at the right. A test of one or more of these lubricants may help solve three of your most pressing problems today: 1. reducing maintenance time; 2. eliminating unnecessary shutdowns and replacements; 3. increasing output of your present loading equipment.

2. Superla Mine Loader Lubricants are service tested. All lubricants in the Superla line are in use in mines and have proved their ability to handle the difficult job of loader lubrication. In a Wyoming mine, a test of Superla in one loader resulted in its use in *all* loaders in this mine, and in *four other operations* of the company. One mine reports that in one year no Joy Loader repairs have been caused by lubricant failures. Another mine reports decreased costs and reduced mechanical repairs with Superla even though it replaced a higher priced loader lubricant.

3. Standard Lubrication Engineers will help you make a test. If your mine or mines are located in the Middle West, Standard Lubrication Engineers are ready to help you find out just where Superla Mine Loader Lubricants can improve your loader operation, or reduce your costs. They will be glad to analyze operating conditions in your equipment, and specify the lubricant grades required by its age and condition. They have a simple form for recording the information on which to base the tests.

Send for the folder "How To Test Mine Loader Lubricants." It not only suggests a method for making these tests, but it points out reasons why you may find it to your advantage to re-examine your loader lubrication. It includes the test form. Paste the coupon on a postcard and mail it to Standard Oil Company (Indiana), 910 S. Michigan Ave., Chicago 5, Illinois. In Nebraska, write Standard Oil Company of Nebraska at Omaha 2. If you would like to make a test of Superla Mine Loader Lubricants, write to the Chicago address, or call any Standard Oil Company (Indiana) office for the Engineer nearest you.

New Superla Mine Loader Lubricants Include:

No. 3—A dripless oil for fairly tight loader gear cases; excellent for wick feed oilers on loaders and locomotive bearings.

No. 4—A fibrous type thickened oil particularly for Goodman Loader lubrication.

No. 5—A fibrous type thickened oil for gears and transmissions on Joy Loaders. Especially useful in reducing consumption.

No. 6—A fibrous type thickened oil for gear cases and gathering head pots on Joy Loaders. Can be applied with pressure gun for bearings.

No. 7—A fibrous type oil for general mine lubrication underground—for loaders, shuttle car motor gear cases, and conveyor bearing lubrication.

No. 8—A smooth type, heavy thickened oil for armature bearings and makeup in cases requiring a leak-resisting lubricant.

INDOILS . . . Three grades of straight mineral oils for hydraulic systems.

No. 41, **No. 75**, **No. 95** } Provide a range of viscosities to meet all loader hydraulic system requirements.

Oil Is Ammunition . . . Use It Wisely

SEND FOR THIS FOLDER

Standard Oil Company (Indiana)
Room 1225, 910 S. Michigan Ave.
Chicago 5, Illinois

Gentlemen: Please send me the folder "How To Test Mine Loader Lubricants."

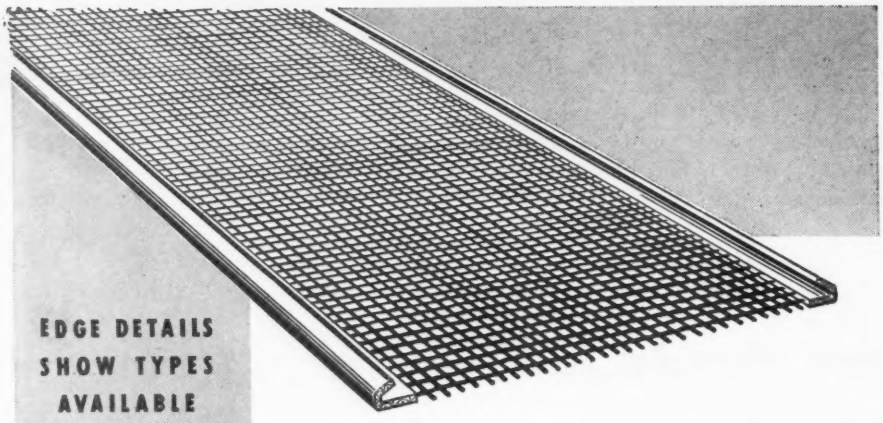
*Name*_____

*Company*_____

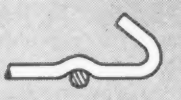
*City*_____ *State*_____

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

★ LUBRICATION ENGINEERING

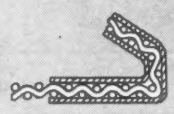


EDGE DETAILS SHOW TYPES AVAILABLE



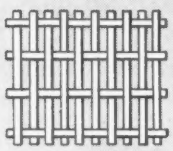
Type 1: Turned Edge.

Type 2: Metal Reinforced Edge.



Type 3: Double Metal Reinforced Edge (illustrated above).

Type 4: Square Bar.



Above—two types from the wide list of Roebling Woven Wire Screen weaves available. Top, rectangular mesh. Lower, square mesh.

Vibrator Screens

WITH TURNED OR METAL-REINFORCED EDGES

***made to order by* ROEBLING**

YOU CAN NOW ORDER from Roebling vibrator screens with turned or reinforced edges made to your exact specifications. From the complete line of Roebling Woven Wire Screens, you can choose the mesh size, wire diameter and kind of wire that meets your needs exactly.

The manufacture of wire screen is a specialized art at the Roebling mills. Use our facilities to keep pace with the modern demand for coal that is accurately graded and cleaned.

Woven Wire Fabrics Division

JOHN A. ROEBLING'S SONS COMPANY

TRENTON 2, NEW JERSEY

Branches and Warehouses in Principal Cities

ROEBLING

PACEMAKER IN WIRE PRODUCTS

WIRE ROPE AND STRAND • FITTINGS • AERIAL WIRE ROPE SYSTEMS • SUSPENSION BRIDGES AND CABLES • COLD ROLLED STRIP • HIGH AND LOW CARBON ACID AND BASIC OPEN HEARTH STEELS • ROUND AND SHAPED WIRE • ELECTRICAL WIRES AND CABLES • WIRE CLOTH AND NETTING • AIRCORD, SWAGED TERMINALS AND ASSEMBLIES

attacked the bill. "A tax like that would seriously affect the production of coal in Kentucky," he said. "Coal is taxed enough already."

•

Iowa Hydro Project Dismissed by EPC

Application for a certificate for a hydroelectric project by the First Iowa Hydro-Electric Corp. has been dismissed by the Federal Power Commission. The order, entered Jan. 29, dismisses the application on the grounds that the applicant did not present satisfactory evidence of compliance with the requirements of applicable laws of the State of Iowa.

The application, filed Aug. 11, 1941, sought permission to construct and operate a power development on the Cedar River in Muscatine and Cedar counties, Iowa, and extending to the Mississippi River. It was proposed to construct an 83,000-ft. dam, a 15,000-ft. dyke, a reservoir of 11,000 acres, a diversion canal, a power house having four turbo-generating units with aggregate generating capacity of 70,000 hp., together with appurtenant structures.

Among those opposing granting of the license were the National Coal Association, Northern Illinois Coal Trade Association, Coal Trade Association of Indiana, Illinois Coal Traffic Bureau and Iowa Coal Institute.

•

Charge Safety Breach In Death of 14

Six officials of the Moffat-Schrader anthracite mine, Lytle, Pa., were arrested Feb. 4, charged with violations of mine safety laws in connection with the death of 14 men in a mine explosion last Sept. 24. Those summoned to answer charges were A. J. Schrader, president; George Sukeena, assistant mine foreman; Griffith Davis, contractor; R. E. Waskins, contractor and mine foreman; J. N. Farley, general manager, and Robert Miller, assistant mine foreman.

A coroner's inquest decided that the miners perished as a result of an accumulation of gas in the improperly ventilated mine. The warrants were issued upon application of State Mine Inspector Harvey Hilbert.

•

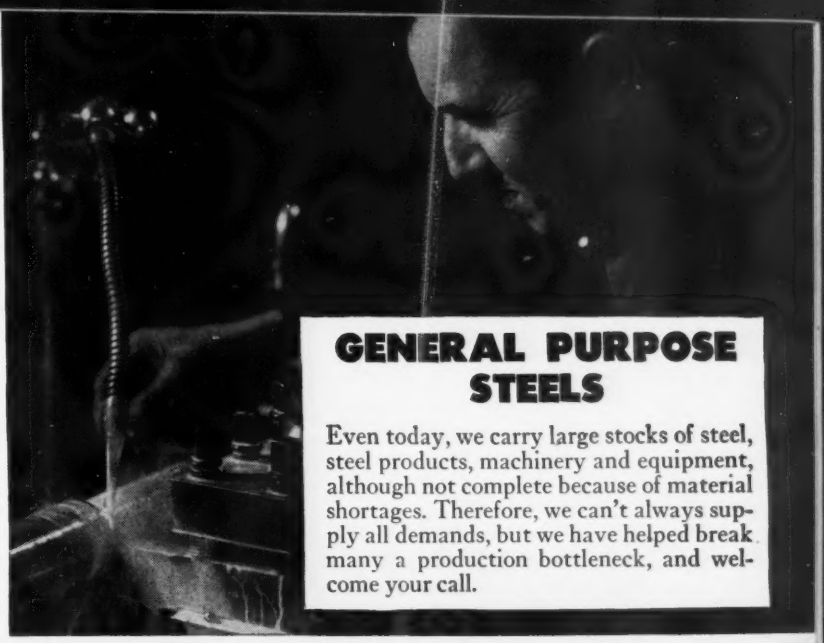
To Reopen Old Mines

Pittsburgh Coal Co. is preparing to reopen the old Cincinnati and Star coal mines, near Courtney, in Union Township, Washington County, Pennsylvania, the company has announced. The combined operation of the two mines will be known as Mingo, and following necessary preliminary work, such as cleaning up old working and tracklaying, it is expected that by the end of this year production will reach 1,000 tons per day.

Coal will be loaded over a temporary rail tipple and, according to the company, the unworked portion of the two old

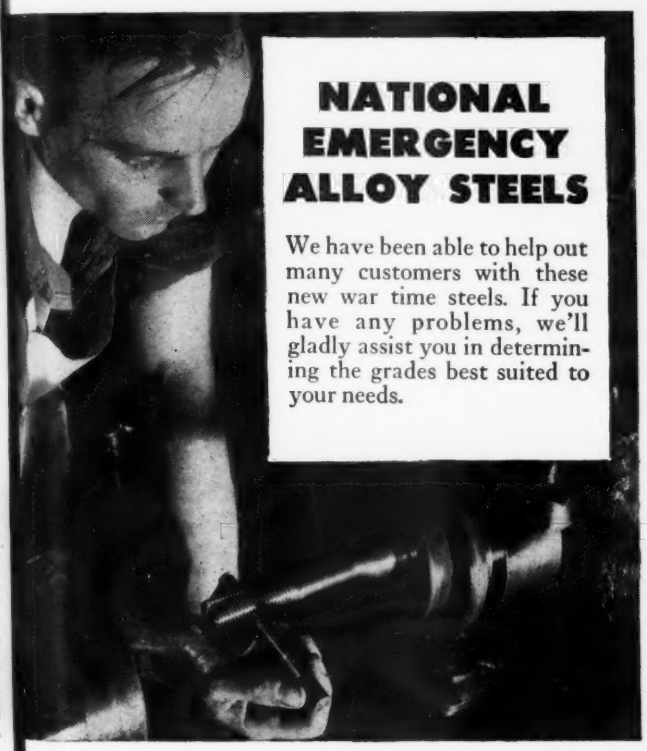
LOOKING FOR STEEL?

A call to us may solve your problem. Our job is to keep war production moving, so if you need steel, we'll get it to you in a hurry, if at all possible—subject, of course, to priority regulations. We will appreciate receiving your inquiries—phone, write or wire our nearest warehouse. You'll get prompt, courteous attention.



GENERAL PURPOSE STEELS

Even today, we carry large stocks of steel, steel products, machinery and equipment, although not complete because of material shortages. Therefore, we can't always supply all demands, but we have helped break many a production bottleneck, and welcome your call.



NATIONAL EMERGENCY ALLOY STEELS

We have been able to help out many customers with these new war time steels. If you have any problems, we'll gladly assist you in determining the grades best suited to your needs.

FOR WELDING NEEDS

We can supply Welding Wire for electric arc welding, such as:

STAINLESS STEEL ELECTRODES
HARD-SURFACING ELECTRODES
MILD CARBON ELECTRODES

We also offer Welding Machines, Protect-O-Metal for elimination of weld spatter and Havens "C" Protected Clamps. Write, phone or wire our nearest warehouse.

Send for our new Stock List and Reference Book—it's FREE

Send for FREE copy of our new Stock List and Reference Book

UNITED STATES STEEL SUPPLY COMPANY

CHICAGO (90),	1319 Wabansia Ave., P. O. Box MM	Teletype CG. 605	BRUnswick 2000
BALTIMORE (3),	Bush & Wicomico Sts., P. O. Box 2036	Teletype BA. 183	GILmore 3100
BOSTON (34),	176 Lincoln St., Allston, P. O. Box 42	Teletype BRTN. 10	STAdium 9400
CLEVELAND (14),	1394 E. 39th St.,	Teletype CV. 153	HEnderson 5750
MILWAUKEE (1),	4027 West Scott St., P. O. Box 2045	Teletype MI. 587	Mitchell 7500
NEWARK (1), N.J.,	Foot of Bessemer St., P. O. Box 479	Teletype NK. 74	Bigelow 3-5920
			REctor 2-6560 - BErgen 3-1614
PITTSBURGH (12),	1281 Reedsdale St., N. S.	Teletype PG. 475	CEdar 7780
ST. LOUIS (3),	21st & Gratiot Sts.,	Teletype SL. 384	MAin 5235
TWIN CITY,	2545 University Ave., St. Paul (4), Minn.	Teletype STP. 154	NEstor 2821

UNITED STATES STEEL SUPPLY COMPANY
USS
STEELS
SERVICE

UNITED STATES STEEL

Your GENUINE FLEXIPIPE is precious...Here's how to protect it

YOUR needs for new Genuine Flexipipe can be filled promptly, but that doesn't minimize the fact that it is made of scarce materials and that, in these war days, it should be carefully conserved. Your *Genuine Flexipipe* is sturdily made of tough materials but, by proper handling and care, you can prolong its life, help the war effort . . . and save money.

Here are a few things to remember: Suspend Flexipipe; don't lay it on the ground . . . Keep it away from sharp rocks, or other cutting or abrasive objects . . . Install angles and curves properly; don't pinch or constrict the tube . . . Whenever possible, between installations, take the Flexipipe above ground for thorough, careful drying . . . Repair holes, tears or damaged places promptly; it's easily done . . . When buying new *Genuine Flexipipe*, be sure to specify the right grade for your requirements; buying the Light Duty Grade for heavy duty work is not good economy.

Mail the coupon today for descripture literature on *Genuine Flexipipe*.

Specify GENUINE FLEXIPIPE

THE ORIGINAL FLEXIBLE VENTILATING TUBING

BEMIS BRO. BAG CO., 408-O Pine Street, St. Louis 2, Missouri

Please send literature on *Genuine Flexipipe*.

*Name*_____

*Company*_____

*Street*_____

*City*_____ *State*_____

mines may prove less productive and for a while require fewer men than other operations of the company, but the output will supplement badly needed deep-mined coal. Ultimately, the company said, these old mines will provide access to large coal reserves owned in an adjacent area of Washington County.

•

Britain Names Three As Strip Consultants

Three Americans have been named as consultants on strip mining in Britain by the British Ministry of Works in London. Those named are Kenneth Youngs, head of the Winslow Coal Corp., Petersburg, Ind.; Harold Bailey, consulting mining engineer, Schuylkill Haven, Pa., and Robert Bazley, coal stripping contractor and engineer, Port Carbon, Pa. They have been selected for consultation on a strip mining project covering 400 square miles in northern England.

The Ministry of Works, according to the consultants, has purchased 300 draglines and a number of power shovels for shipment to England. The engineers are to arrive in Britain by plane in advance of the machinery and crews, which are to be drawn from the Callahan Construction Co., Dallas, Texas.

•

Clerks' Pay Raised

Supervisors and clerks employed by anthracite mines were given pay increases of $8 a month, retroactive to May, 1943, under a War Labor Board decision announced Feb. 5. The Board said the increase was ordered to bring the earnings of the workers, who are not covered by the operators' contracts with the United Mine Workers, up to the maximum allowed them under the "Little Steel" formula. This is equivalent to the 32.2c. a day increase allowed miners covered by the U.M.W. contract in a Board decision of Oct. 28 last.

The Board rejected a request by the operators for an additional blanket increase of $9.50 a month for supervisory and clerical workers, proposed as an equivalent of the increased earnings the miners were granted on Nov. 3 for increased work.

•

Coke Plant to Test Smokeless Processes

An experimental coking plant costing $35,000 is to be constructed at Hillsboro, Ill., by the Illinois Coal Products Commission to determine which of two processes to convert Illinois high-volatile coal into smokeless fuel for the St. Louis market is less expensive, it was announced Feb. 12 by State Senator Rice W. Miller, Hillsboro, chairman of the commission.

The processes to be tested were developed by Ludwig Kern, former resident of Germany and at one time associated with the Krupp Works, now living in St. Louis, and Corlus W. McKinney, a Belle-

Tim Malloy *says*...

It is good to know when you're swinging a cutter around, that your cap lamp isn't going to black out. The WHEAT Lamp's two separate bulbs prevent that. That's a real feature, too!

THESE FEATURES MAKE *WHEAT* THE OUTSTANDING ELECTRIC CAP LAMP

1. Two bulbs (one for emergencies) — miner is never in the dark.
2. Headpiece weighs less than 6 ounces, Lamp Cord 6 ounces, Battery 62 ounces — Total weight of Lamp complete 74 ounces.
3. Headpiece molded of strong bakelite, sealed, moisture-proof and dust-proof.
4. Rubber battery case — non-conductor of electricity — a valuable safety feature.
5. Battery solution (free) limited to one ounce total both cells.
6. Lead-acid type battery maintains high voltage throughout shift (80 + percent efficiency) — year after year.
7. Battery charged through headpiece and cord of cap lamp — a daily test of all connections.
8. Designed for self-service charging system for lowest lamp-house operating cost.
9. To charge, headpiece is simply slipped on to key in charging rack, and turned to make contact. Nothing to take apart — unit-sealed construction.

WHEAT

The Approved Cap Lamp

Write today—

WHEAT LAMP SALES, INC.

1501 Kanawha Valley Bldg., Charleston, W. Va.

SPECIALISTS IN MINE LIGHTING FOR 30 YEARS

KOEHLER MFG. CO.

Marlboro, Mass.

RUGGED - DEPENDABLE SENSITIVE

2

Amsco Manganese Steel Dippers *Help Step Up* Strip Mine Output

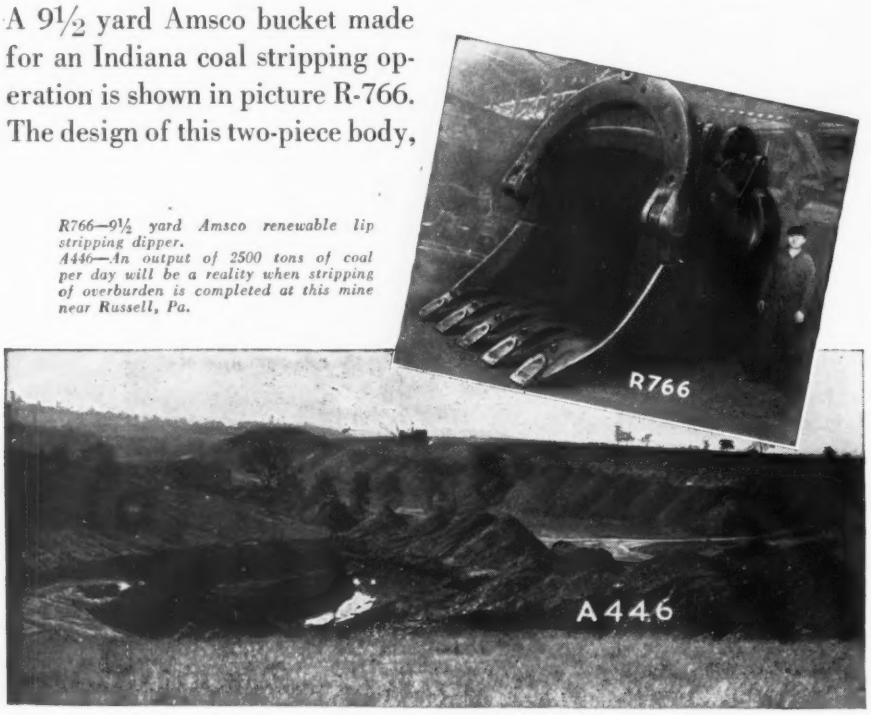
To feed the hungry war production furnaces, many new strip mines have been opened in Pennsylvania, Ohio, Indiana and other fields.

To maintain production schedules, it is important that there should be as few interruptions for equipment repairs and replacements as possible. This applies particularly to the dippers, which are subject to abrasive wear as well as heavy stresses and impacts. Austenitic manganese steel is unequalled for service in coal-stripping conditions. It work-hardens from impact, increasing its ability to resist abrasion without affecting its body toughness. It is the logical metal for heavy-duty dippers.

A 9½ yard Amsco bucket made for an Indiana coal stripping operation is shown in picture R-766. The design of this two-piece body, renewable lip dipper offers comparatively light weight with adequate strength and enables fast digging and dumping, full loads, long operating life and, as a result, the lowest ultimate cost.

Long life is assured by the use of tough work-hardening manganese steel throughout. The scoop-like lip penetrates the overburden readily and reduces resistance at the sides by rolling the material inwardly, thereby minimizing "crowding" power required. The lip is easy to change when replacement becomes necessary. Amsco renewable lip dippers are available in all sizes from ¾ yd. up.

Ask for Bulletin 641-D on Power Shovel Dippers and Parts.



R766—9½ yard Amsco renewable lip stripping dipper.
A446—An output of 2500 tons of coal per day will be a reality when stripping of overburden is completed at this mine near Russell, Pa.

Amsco Conservation Welding Jobs are shown in Bulletin 941-W

Amsco
AMERICAN MANGANESE STEEL DIVISION
Chicago Heights, Illinois

AMERICAN Brake Shoe COMPANY

FOUNDRIES AT CHICAGO HEIGHTS, ILL.; NEW CASTLE, DEL.; DENVER, COLO.; OAKLAND, CALIF.; LOS ANGELES, CALIF.; ST. LOUIS, MO.
OFFICES IN PRINCIPAL CITIES

ville (Ill.) engineer. Kern's method, according to figures presented to the commission, will manufacture coke at a cost of $2.45 to $2.65 a ton, whereas the per ton cost of coke under the McKinney process is estimated at $1.20.

•

Men Quit as Bosses Spurn New Union

About 1,000 miners quit work Feb. 10 at the Monroe Coal Mining Co., Revloc, Pa., when a number of foremen reportedly refused to join a new union of supervisory employees. The walkout started the day before, when 15 men stopped work in protest against working with foremen and firebosses who refused to join the new union, a division of the United Mine Workers of America.

A three-day strike of 155 men who protested that they had to walk too far after leaving the man-trip inside the Big Bend Coal Co. mine at Twin Rocks, Pa., ended the same day.

•

Anthracite Facts Explained

An advertising and information program to promote better understanding and cooperation between anthracite consumers, dealers, miners and the industry as a whole in the present coal emergency has been launched throughout the anthracite-consuming and producing territory by Anthracite Industries, Inc.

Frankly recognizing that present anthracite production is inadequate to meet current abnormal demands, the program employs newspaper advertising, radio, leaflets and informative publicity to stimulate increased production, to encourage consumer conservation and to help the dealer by explaining the facts of the situation to the public.

The initial phase of the program is a newspaper and radio campaign directed to the producing region. Headed "People Are Sore at Anthracite," the first of a scheduled series of 13 weekly advertisements designed to increase production appeared in 16 principal region newspapers the middle of January. It emphasized to miners and region public alike the extent of consumer hardship and dissatisfaction resulting from the current shortage and the potential harm that might be done the entire region as well as the miners and producers by loss of markets if every effort was not made to increase production.

Radio also is being used to bring a direct appeal to miners to produce more coal each working day. Known as "The Coal Call," this all-region program first went on the air over the Anthracite Network in January. Each week for 13 weeks it is presented nightly at 6:45 to 7, Monday to Friday. Originating from station WAZL, Hazleton, the program also is broadcast from WARM, Scranton; WBAX, Wilkesbarre, and WKOK, Sunbury. Rebroadcasts are made the following day from stations WGBI, Scranton; WBRE, Wilkes-Barre, and WEEU, Reading.

MORE COAL *goes to war—*

when lubrication is right

Your equipment is precision-built for long dependable service under normal operating conditions. But long periods of round-the-clock schedules have greatly multiplied the problem of avoiding excessive wear, mechanical troubles, and shutdowns.

Today better lubrication care is a vital necessity to keep tonnage rolling! Now, more than ever, you need the helpful counsel of a Gulf Lubrication Service Engineer.

With a background of thorough training and broad practical experience, Gulf Lubrication Service Engineers are specialists in coal mine lubrication—they *know how* to get top performance from every unit of mine equipment by the scientific selection and application of lubricants.

For maximum production and minimum maintenance costs in *your* mine, make sure of your lubrication—call in a Gulf Lubrication Service Engineer, then keep him "in the picture." Write, wire, or phone your nearest Gulf office today.

Back the Attack— Buy more War Bonds

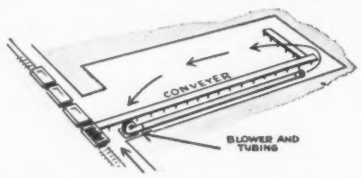
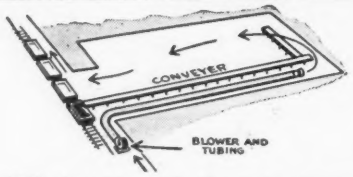
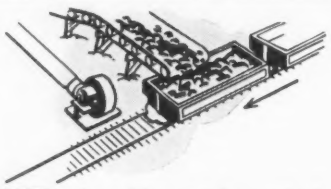
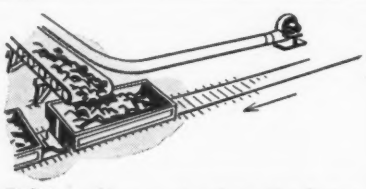
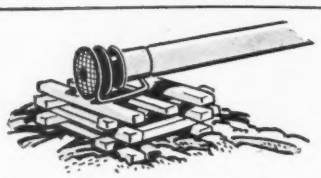
GULF INDUSTRIAL LUBRICATION

GULF OIL CORPORATION · GULF REFINING COMPANY

Gulf Building, Pittsburgh, Pa.

AVOID THESE COMMON MISTAKES IN USING BLOWERS AND TUBING

There's a right way to get greatest efficiency and safety with "Ventube"

WRONG	RIGHT
 **DON'T** place blower in room neck with no other outlet for air.	 **DO** place blower in the main air current at least 15 feet "upstream" of the outgoing air. This avoids re-circulation.
 **DON'T** place blower where air is dusty.	 **DO** keep blower away from the dusty discharge point of conveyers.
DON'T let blower become buried in rubbish.	 **DO** keep blower intake clear . . . allow adequate air supply *always*. Mount on crib, if necessary.

Properly used, blowers and tubing are important assets in many mines today. They carry adequate quantities of clean air up to the dead ends of entries and rooms where the main current would never go unaided, bringing much-needed oxygen to hard-working men. After a blast, they clear the face, reducing waiting time and adding many productive minutes to every shift.

But improperly used, blowers and tubing—like most other mine equipment—may be inefficient and unsafe. Practical experience shows these *wrong* and *right* ways to use blowers and Du Pont "Ventube."

Du Pont "Ventube" is flexible tubing, sturdy fabric impregnated and coated with a special abrasion-resistant compound. It resists heat, moisture, mildew, dry-rot, acid and alkaline waters. It is easily carried and stored. If damaged by careless handling, it is as easily patched as an inner tube.

Properly suspended, free of sharp bends, and attached to a fan with adequate capacity and with permissible motor, "Ventube" flushes the face with fresh air . . . helps remove dust and bad air from any space a man can enter . . . speeds the production cycle . . . promotes health and steady efficiency of workers . . . is a vital part of the nation's war production effort. Use "Ventube" . . . and when you do, use it *right*. E. I. du Pont de Nemours & Co. (Inc.), "Fabrikoid" Division, Fairfield, Connecticut.

NOTE: *War Production Board regulations permit us to supply "Ventube" for all mining purposes. To expedite delivery, it is urged that you furnish us with complete priority information on your orders.*

DU PONT

VENTUBE

REG. U.S. PAT. OFF.

**"VENTUBE" is Du Pont's registered trade mark for its flexible, rubberized ventilating duct.*

DU PONT REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING...THROUGH CHEMISTRY

Except for occasional guest speakers who report on conditions outside the region, the program is entirely local in character. The entertainment background is provided by an eleven-piece orchestra made up of working miners assisted, from time to time, by the well-known Russo-Carpathian Choir of 20 voices. Appeals for increased production are made by miners, local religious and civic leaders, physicians, business men and others who are concerned with or affected by the present anthracite shortage.

The second phase of the campaign meanwhile has been started with advertisements in 95 daily papers in important cities throughout the anthracite-burning territory. These advertisements are designed to help the public and the newspapers ascertain the facts with reference to hard coal and to encourage consumers to cooperate with their dealers in making available supplies go as far as possible.

Two leaflets for dealer distribution to

In Step With Coal Demand

Bituminous Coal Stocks

	Thousands Net Tons Jan. 1 1944	P.c. Change From Dec. 1 1943	P.c. Change From Jan. 1 1943
Electric Power utilities	14,747	−6.9	−26.2
Byproduct coke ovens	6,306	+8.4	−41.2
Steel and rolling mills	705	.....	−38.1
Railroads (Class I)	9,496	−8.1	−24.5
Other industrials*	20,097	−9.5	−35.7
Total	51,351	−6.5	−32.2

Bituminous Coal Consumption

	Thousands Net Tons Dec. 1943	P.c. Change From Nov. 1943	P.c. Change From Dec. 1942
Electric power utilities	7,485	+9.0	+21.5
Byproduct coke ovens	7,868	+7.4	+3.8
Steel and rolling mills	1,001	+3.9	−3.1
Railroads (Class I)	11,903	+7.3	+6.7
Other industrials*	15,599	+12.7	+2.5
Total	43,856	+9.4	+6.6

* Includes beehive coke ovens, manufactured-gas plants and cement mills.

Bituminous Production

January, 1944, net tons	53,800,000
P.c. change from Dec., 1943	+3.4
P.c. change from Jan., 1943	+12.5

Anthracite Production

January, 1944, net tons	4,887,000
P.c. change from Dec., 1943	−1.7
P.c. change from Jan., 1943	+10.0

Sales, Domestic Stokers Vs. Oil Burners

	Stokers	Burners
December, 1943	2,328	2,727
P.c. change from Nov., 1943	−9.0	+36.0
P.c. change from Dec., 1942	+60.9	+45.9
Jan.-Dec., 1943	27,012	18,524
P.c. change from Jan-Dec., 1942	−67.4	−66.4

Index of Business Activity*

Week ended Feb. 19	242.8
Month ago	241.9
Year ago	227.3

* *Business Week*, Feb. 26.

Electric Power Output†

Week ended Feb. 19	4,511,562,000
P.c. change from month earlier	−0.5
P.c. change from year earlier	−14.3

† Edison Electric Institute.

. . . and WHAT a foxhole !

You're right, soldier, it *is* a foxhole. Not the kind you dug in Tunisia or Guadalcanal — but just as important in conducting offensive measures against the enemy.

In this kind of foxhole, vast beds of coal and ore are uncovered at depths of 100 feet and more — to permit mining from the surface with modern excavators — to do it faster, with fewer men — without tedious hand methods.

These huge open pits are a tribute to America's mass production methods — to the big electric shovels that dig day and night to feed smelters, blast furnaces, cement mills and other vital industries with the raw materials we need to win.

Yes, they're far behind the lines of actual combat. But you can count on the P&H Electric Shovels to stay in the fight until the last shot has been fired. Then, they'll resume their peacetime jobs to help build the better world of the future.

P&H

Overhead Cranes • Electric Hoists
Excavators • Welding Positioners
Arc Welders • Welding Electrodes

4540 WEST NATIONAL AVENUE
MILWAUKEE 14, WISCONSIN

HARNISCHFEGER
CORPORATION

EXCAVATORS • ELECTRIC CRANES • ARC WELDERS | P&H | HOISTS • WELDING ELECTRODES • MOTORS

. . . from Working Face to Tipple

Duff-Norton Jacks will Help!

Efficient, dependable equipment is essential to fast, safe mining. Duff-Norton Jacks help you keep production up by providing mechanical muscles to help with lifting, lowering, pushing and pulling.

Keep up to quota on your share of the 5½ million tons of coal, rock and ore, dug every day. Use Duff-Norton Jacks in your operations. Catalog 202 gives complete data and descriptions. Write for your copy today.

Your Industrial Distributor handles DUFF-NORTON JACKS

"The House That Jacks Built"

THE DUFF-NORTON MANUFACTURING COMPANY

PITTSBURGH, PENNSYLVANIA

Canadian Plant: COATICOOK, QUEBEC • Representatives in Principal Cities

customers also have been prepared by Anthracite Industries, Inc. Over 1,500,000 copies of the first, "How to Conserve Anthracite and Improve Your Heating," already are in the hands of consumers. Obtainable from the several offices of Anthracite Industries, Inc., it tells householders how to save coal by maintaining their homes and heating plants at top efficiency at all times, and by firing and banking correctly.

Because dealers today often cannot give their customers the size of hard coal to which they are accustomed, Anthracite Industries, Inc., has prepared an additional instruction sheet on how to burn the various domestic sizes.

As a further aid to the consumer, numerous articles and photographs, showing the many ways in which householders can economize in the use of coal, are being distributed to, and published by, leading newspapers and magazines serving the primary anthracite-marketing area. The entire coordinated program above described already is producing evidence that it is contributing substantially to building future good will for the anthracite industry and all those associated with it.

•

Preparation Facilities

Atkins Coal Co., Frackville, Pa.—Contract closed with Wilmot Engineering Co. for two Type A Simplex jigs to prepare No. 1 buckwheat and pea coal; total feed capacity, 30 t.p.h.

DeAngelis Coal Co., Carbondale, Pa.—Contract closed with Deister Concentrator Co. for four SuperDuty diagonal-deck No. 7 coal-washing tables for rice, barley and No. 4 buckwheat coals.

Dragondale Coal Corp., Mt. Carmel, Pa.—Contract closed with Deister Concentrator Co. for one SuperDuty diagonal-deck No. 7 coal-washing table, rice.

Jonathan Coal Mining Co., Barton plant, Dornside, Pa.—Contract closed with Deister Concentrator Co. for one SuperDuty diagonal-deck No. 7 coal-washing table to treat No. 5 buckwheat coal.

Morea-New Boston Breaker Corp., Morea Colliery, Pa.—Contract closed with Deister Machine Co. for two No. 16 Deister Plat-O coal-washing tables to clean barley coal at a normal rated capacity of 15 t.p.h. per table.

Mt. Pleasant Mining Corp., Terre Haute, Ind.—Contract closed with Deister Machine Co. for one double-deck 4x6-ft. Deister Plat-O heavy-duty vibrating screen to produce stoker coal at a capacity of 60 t.p.h. feed; replaces another type vibrating screen and is in addition to the company's regular equipment of shaker screens.

Phoenix Coal Co., Pottsville, Pa.—Contract closed with Deister Machine Co. for three No. 16 Deister Plat-O coal-washing tables to clean No. 1 buckwheat, rice and barley coal at a rated capacity of 15 t.p.h. per table.

Republic Steel Corp., Virginia Mine, Virginia City, Ala.—Contract closed with Fairmont Machinery Co. for Chance sand

How to stretch the life of those precious cables

• There's a bigger-than-ever production quota to be met this year, and electric cables are going to play a mighty important part in the result. Don't wait until those vital cables are beyond repair — you know how hard they are to replace. Keep them in the fight with tough, double-grip Ruberoid Insulating Tape.

Ruberoid Insulating Tape does more than a patch-up job, it practically renews cable! Nothing like it for safe, fast, tight splicing and insulating. Another thing, it *lasts,* because it's built to withstand the roughest treatment. Your mine supply house carries it—make sure you have it on hand by getting in an order today.

Only RUBEROID INSULATING TAPE has all these 7 features

1. Double grip—both sides adhesive
2. Great tensile strength . . . tough
3. Won't tear, ravel or pucker
4. Resists abrasion
5. Acid- and alkali-proof
6. Extra thick . . . one layer insulates
7. Exceeds A.S.T.M. specifications by 300% in adhesiveness, 26% in tensile strength, 290% in dielectric strength

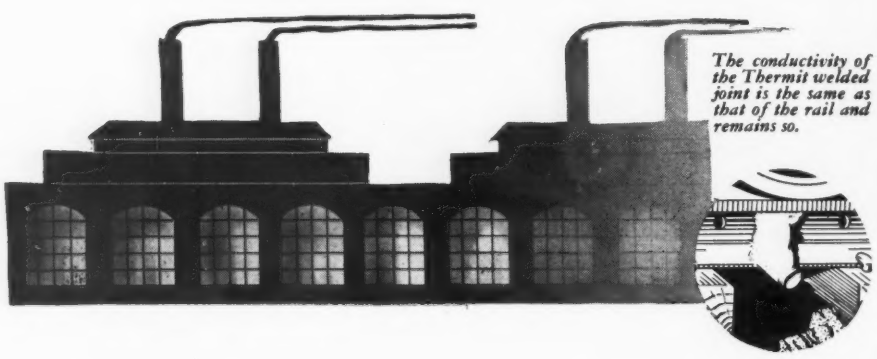
OTHER RUBEROID PRODUCTS FOR COLLIERIES

ROLL ROOFING & SHINGLES
INSULATING PAINTS
BUILT-UP ROOFS
ASBESTOS INSULATIONS
ASBESTOS AND MAGNESIA
PIPE COVERINGS
ROOF COATINGS AND PLASTIC
CORRUGATED ASBESTOS-CEMENT
ROOFING AND SIDING
STONEWALL BOARD

RUBEROID'S INSULATING TAPE

The RUBEROID Co., *Executive Offices,* 500 Fifth Ave., New York 18, N.Y.

LOWER POWER CONSUMPTION ON JOINTLESS TRACK



● Less power is required to haul on Thermit welded continuous rail, because no power is lost through loose and battered bonds. Conductivity of welded joints is the same as that of the rail and remains so for the life of the track.

Another important and obvious economy effected by continuous rail is the absolute elimination of joint maintenance, estimated by the American Railway Engineering Association at 45% of all track maintenance. And, obviously, continuous rail is not subjected to pounding at joints and, therefore, renders longer service.

Thermit Welding is readily accomplished by your own crew after brief instruction by a Metal & Thermit supervisor. The Thermit process has been widely used for almost forty years, for rail welding, to repair serious breaks in heavy machinery; and, more recently, for the fabrication of heavy parts. The process is practicable for existing as well as new rails. May we send you interesting particulars?

METAL & THERMIT CORPORATION
120 BROADWAY, NEW YORK 5
ALBANY • CHICAGO • PITTSBURGH • SO. SAN FRANCISCO • TORONTO

Specialists in welding for nearly forty years. Manufacturers of Murex Electrodes for arc welding and of Thermit for repair and fabrication of heavy parts.

flotation cleaning plant to treat 4x¼-in. coal; capacity, 150 t.p.h.; addition to existing facilities.

Ryon Coal Co., Pottsville, Pa.—Contract closed with Deister Machine Co. for one No. 16 Deister Plat-O coal-washing table to wash rice coal at a rated capacity of 15 t.p.h.

Sandy Run Miners & Producers, Inc., Upper Lehigh, Pa.—Contract closed with Deister Concentrator Co. for two Super-Duty diagonal-deck No. 7 coal-washing tables to clean barley and No. 4 buckwheat coal.

Waddell Coal Mining Co., Winton, Pa.—Contract closed with Deister Concentrator Co. for three SuperDuty diagonal-deck No. 7 coal-washing tables to treat rice, barley and No. 4 buckwheat coal.

Winton Coal Co., South Tamaqua, Pa.—Contract closed with Deister Machine Co. for one No. 16 Deister Plat-O coal-washing table to clean No. 2 buckwheat coal at a rated capacity of 15 t.p.h.

Personal Notes

John J. Durkin, Morgantown, W. Va., has been appointed special mine inspector for the Northern Division of West Virginia.

Alvis Mercer has been appointed superintendent of mines of the Fleming division of the Elk Horn Coal Corp., Fleming, Ky., filling the vacancy caused by the death of I. S. Ramsey, Dec. 20. Mr. Mercer moved to this position from the Tierney Mining Co., Stone, Ky., where he was superintendent of Tierney mine.

Harry G. Kennedy, labor commissioner of the Kanawha Coal Operators' Association, Charleston, W. Va., has been appointed by Coal Mines Administrator Harold L. Ickes as a consultant to C.M.A. A son of Duncan Kennedy, executive secretary, Kanawha Coal Operators' Association, and vice-president, Winifrede Collieries Co., the younger Mr. Kennedy is 40 years old, earned B.S. and M.S. degrees at West Virginia University and was employed as a combustion engineer and salesman by the Carbon Fuel Sales Co. before joining the Kanawha association.

Charles R. Griffith, vice-president of the Southern Coal & Coke Co., Knoxville, Tenn., for the last two years, has been elected president of the company. He succeeds E. C. Mahan, who becomes chairman of the board. Mr. Griffith was head of the Knoxville unit of a national merchandising company before joining Southern as vice-president in charge of the wholesale department in July, 1942.

Fred K. Prosser, coal traffic manager, Norfolk & Western Ry., has been appointed as Assistant Deputy Solid Fuels Administrator, it was announced by Secretary Ickes Feb. 2. Born 54 years ago and earning B.S. and Ch.E. degrees at Virginia Polytechnic Institute, he began his career as a mining and civil engineer

AO GOGGLES HELP KEEP YOUR MEN ON THE JOB

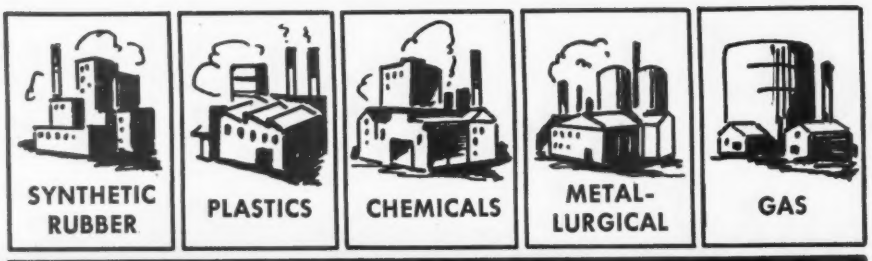
Never has the production of coal been so important as it is now. Every available miner is needed to keep the coal cars rolling.

Don't let eye accidents strike in *your* property to rob you of the services of irreplaceable men, disrupt production schedules and raise cost-per-ton.

American Optical Company offers you, through The Mine Safety Appliances Company, a line of goggles that were designed to protect against every possible eye hazard that your workers face in their different types of jobs. AO Goggles are light-weight, easy to fit and comfortable,—yet sturdily built and equipped with Super Armorplate Lenses for resistance to flying chips.

Have your Safety Director get in touch with your M. S. A. Representative today.

American Optical
COMPANY
SOUTHBRIDGE, MASSACHUSETTS



THEY'LL ALL BUY YOUR COAL....IF

it is properly blended by means of exact

LABORATORY CONTROL

The increased emphasis on the proper sampling and blending and grading of coal by producers of rubber, chemicals, plastics, fuel and power proves that properly blended COAL is the dominant factor in competitive COAL SALES. Sturtevant Laboratory Equipment will make possible more complete and exact control of coal with less effort, at lower cost.

STURTEVANT
LABORATORY EQUIPMENT

THE STURTEVANT AUTOMATIC COAL CRUSHER AND SAMPLER. Even with the manpower shortage—you can quicky get accurate coal samples—and save time, too. With the improved Sturtevant Automatic equipment you can crush and sample, save 32 hand operations, eliminate all inaccuracy due to the human element, and get a far superior product for shipment to the Laboratory.

Interested? Then write for Bulletin 85—"How to Sample Coal Automatically."

THE STURTEVANT FINE GRINDER

—The Sample Grinder is of the "open-door" disc design, producing products as fine as 100 mesh (coarser, if desired) working on dry, friable, soft or moderately hard materials. Handwheel regulates output from 10 to 100 mesh. Will handle hard rock and ore at reduced capacities. Specifications and prices on request . . . Bulletin 067.

Bulletins

describing Sturtevant Laboratory Equipment upon request—and, if you desire, we will be glad to submit constructive suggestions for increased and sustained postwar COAL SALES through modernized coal preparation.

STURTEVANT MILL CO.
14 HARRISON SQ.,
BOSTON, MASS.

in 1912 in Indiana, Pa.; served as an engineer with the Clinchfield Coal Corp.; was assistant chief engineer and chief engineer, Clearfield Bituminous Coal Corp., 1913-20; was in charge of construction work in Scranton, Pa., and served as chief engineer and general superintendent, Wisconsin Granite Co., joining N. & W. in 1922 as a mine rating commissioner and becoming manager of its coal department in 1931 and traffic manager in 1934.

EDGAR DALE, former superintendent of Nos. 1, 2, 3 and 4 mines of the Elk Horn Coal Corp., Haymond and Fleming, Ky., has been advanced to assistant general superintendent and has been transferred to Wayland, Ky.

R. B. PERRY, chief mining engineer, Sayreton mines, Republic Steel Corp., Sayreton, Ala., has been appointed a member of the Alabama board of mine examiners by Governor Sparkes for the term expiring July 23, 1945. He succeeds T. B. DRYER, resigned.

H. P. WILSON, president and general manager, Crows Nest Pass Coal Co., Fernie, B. C., was elected a vice-president of the Mining Association of British Columbia in February.

KARL KONNERTH has been appointed assistant to the president in charge of engineering, H. C. Frick Coke Co., Pittsburgh, Pa. He has been chief engineer at Uniontown, Pa., since 1941. GEORGE M. THURSBY has been named director of public relations but will continue as assistant secretary, a post he has held since 1939. AUGUST J. BREITENSTEIN has been made chief of engineering, after service with the company since 1941.

E. F. STEVENS, vice-president in charge of operations, Union Colliery Co., St. Louis, with which he has been associated for the last 20 years, has been elected vice-president in charge of production for all Binkley and Pyramid Coal Co. properties, including Indiana. B. H. SCHULL, who has been operating vice-president of the company, with headquarters in Terre Haute, Ind., will devote his efforts exclusively to the company's Indiana operations.

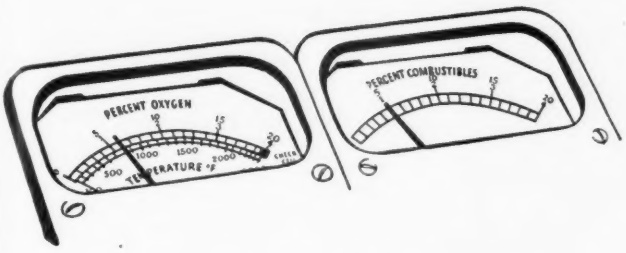
J. B. MORROW, president, Pittsburgh Coal Co., Pittsburgh, Pa., has been named a director of the National Association of Manufacturers for the current year.

PATRICK F. DOUGHERTY, sectional foreman at Loree No. 3 colliery, Hudson Coal Co., Plymouth, Pa., has been appointed inside foreman there, vice GUY E. CONNER, transferred to Loree Nos. 2, 4 and 5.

JOSEPH B. MARTIN, general inside foreman at Loree collieries, Hudson Coal Co., Plymouth, Pa., has been named assistant colliery superintendent there.

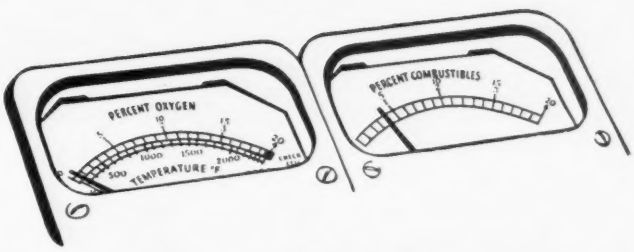
HOWARD J. THOMAS has been appointed Regional Bituminous Coal Manager in addition to Area Distribution Manager, District 13, Solid Fuels Administration for War, the offices having been combined. The district includes mines in Alabama, east Tennessee and Georgia. Mr. Thomas was general superintendent

How to Control Furnace Atmosphere



Make this Test

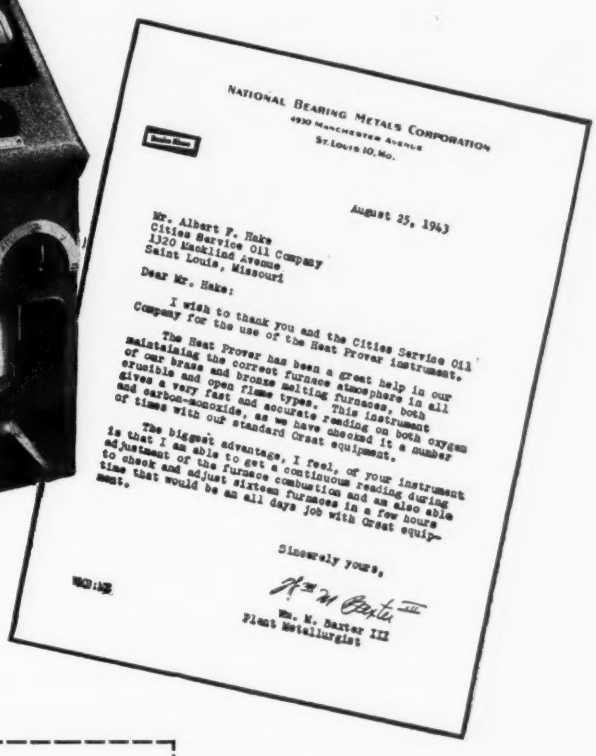
Have a Cities Service Engineer, with the aid of the Industrial Heat Prover, take a test reading* of any combustion equipment in your plant. Note percentage of needless excess oxygen in the furnace atmosphere as registered on the Heat Prover dials.



See the Results

The Cities Service Engineer may then evaluate the Heat Prover analysis against his data and curve charts which are the Standard of Efficiency for the particular equipment . . . and make recommendations for correcting the defect—which in this case would reduce excess oxygen to ½%.

THE CITIES SERVICE HEAT PROVER reveals the degree of waste caused by air deficiency (excess fuel), or the degree of waste caused by dilution (excess air). Through unique means these conditions are measured directly on the two Heat Prover dials . . . one indicates the percentage of unused combustibles, and the other the percentage of excess oxygen which may be present in the spent gases. These readings are continuous and can be made at any instant from combustion samples taken from any part of the furnace, pit or crucible atmospheres.



NATIONAL BEARING METALS CORPORATION
4930 Manchester Avenue
St. Louis 10, Mo.

August 25, 1943

Mr. Albert F. Hake
Cities Service Oil Company
1320 Mackland Avenue
Saint Louis, Missouri

Dear Mr. Hake:

I wish to thank you and the Cities Service Oil Company for the use of the Heat Prover instrument.

The Heat Prover has been a great help in our maintaining the correct furnace atmosphere in all of our brass and bronze melting furnaces, both crucible and open flame types. This instrument gives a very fast and accurate reading on both oxygen and carbon-monoxide, as we have checked it a number of times with our standard Orsat equipment.

The biggest advantage, I feel, of your instrument is that I am able to get a continuous reading during adjustment of the furnace combustion and am also able to check and adjust sixteen furnaces in a few hours time that would be an all days job with Orsat equipment.

Sincerely yours,

H. M. Baxter III
Plant Metallurgist

**Mail this Coupon*

***TODAY FOR AN INDUSTRIAL HEAT PROVER TEST OF YOUR EQUIPMENT*—AT NO COST OR OBLIGATION TO YOU.**

CITIES SERVICE OIL CO.
Room 148
Sixty Wall Tower
New York 5, New York

Gentlemen: Please contact me regarding your Industrial Heat Prover Test.

Name_____

Title_____

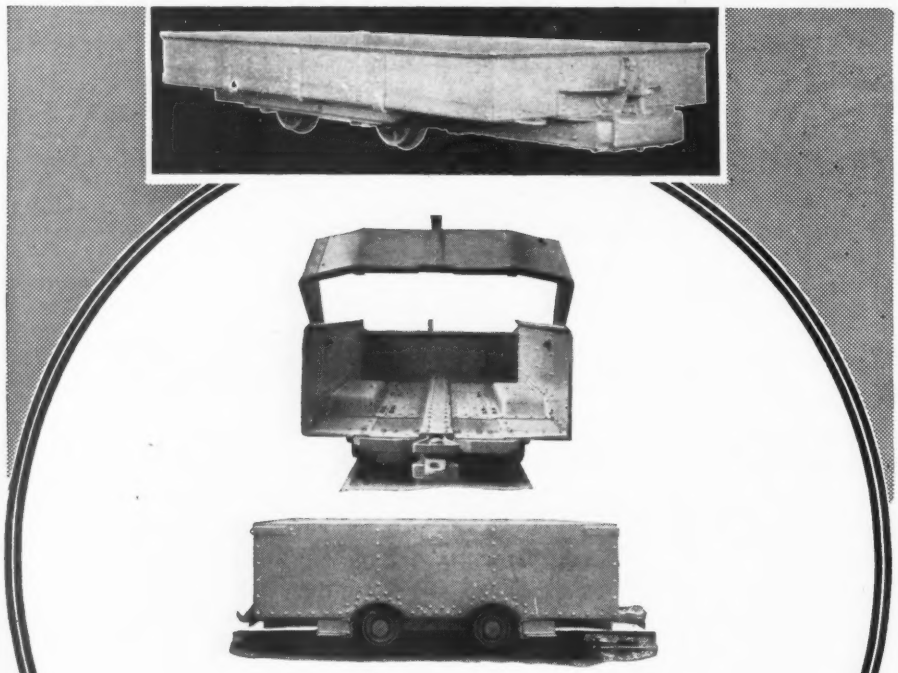
Company_____

City_____

(Available only in Cities Service Marketing Territory East of the Rocky Mountains.)

CITIES SERVICE OILS
ONCE-ALWAYS

CITIES SERVICE OIL COMPANY
ARKANSAS FUEL OIL COMPANY



DESIGNED FOR TODAY'S MODERNIZED COAL MINING OPERATIONS

Steelcar

Built by **Pressed Steel Car** for dependable, continuous haulage, these husky mining cars give you quick, clean dumping, *proved* dependability and continuous maximum haulage service.

Descriptive Bulletin 66 sent on request.

ARMY NAVY

Designers and Builders of Railway Cars Since 1898

PRESSED STEEL CAR COMPANY, INC.
INDUSTRIAL DIVISION
PITTSBURGH, PA.

EQUIPMENT APPROVALS

Four approvals of permissible equipment were issued by the U. S. Bureau of Mines in January, as follows:

Joy Mfg. Co. — Type IIBU-11P loading machine; two motors, 4 and 50 hp.; 250 and 500 volts, d.c.; Approvals 494 and 494A; Jan. 8.

Goodman Mfg. Co.—Type 512-CC shortwall mining machine; 35-hp. motor, 550 volts, d.c.; Approval 495A; Jan. 11.

Goodman Mfg. Co.—Type 360-CH loader; two motors, 50 and 7½ hp.; 220 volts, a.c.; Approval 440; Jan. 18.

Joy Mfg. Co. — Type IIBU-11P shuttle car (storage-battery operated); three 5-hp. motors, 90 volts, d.c.; Approval 496; Jan. 20.

for the Sloss-Sheffield Steel & Iron Co. for 17 years and was connected in an executive capacity with other operations prior to his appointment to SFAW. Ross C. Smith has been appointed Assistant Regional Coal Manager and Assistant Area Distribution Manager.

E. V. Dangerfield has been appointed general superintendent of the Peabody Coal Co.'s Majestic mine, near DuQuoin, Ill.

•

Association Activities

Southern Coal Producers' Association has reelected former Senator E. R. Burke as president; L. E. Tierney, treasurer, and Walter R. Thurmond, secretary.

I. W. Rouzer, for eight years head of the Alabama Mining Institute, was reelected president at the institute's annual meeting, Feb. 8, in Birmingham. Other officers elected were R. T. Daniel, Prince DeBardeleben and Herbert Tutwiler, all vice-presidents; Hubert E. Mills, secretary-treasurer, and James I. Davidson, counsel. Named to the board of directors were H. A. Berg, C. S. Bissell, W. F. Cobb, C. F. DeBardeleben Jr., W. G. Hippard, A. R. Long, H. McDermott, Hugh Morrow, G. F. Peter, J. W. Porter, David Roberts Jr. and B. F. Roden.

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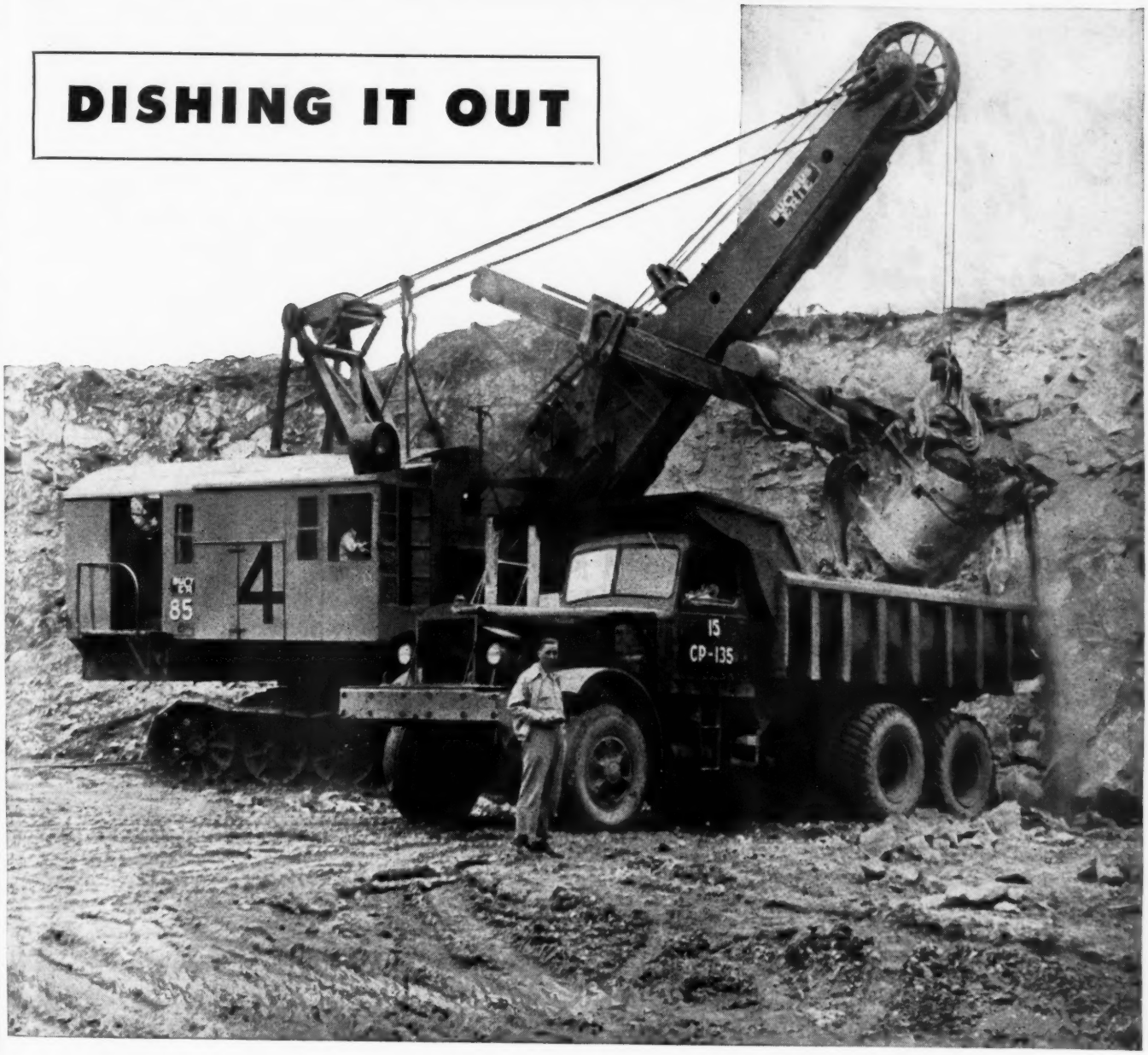
Obituary

Edward Thomas, 68, mining engineer, long prominent in the anthracite industry, died Jan. 31 in Shamokin, Pa. He was recently consulting engineer for the Twin Valley Coal Co.

A. D. W. Smith, 79, formerly president, South-East Coal Co., with operations at Seco and Millstone, Ky., died at Philadelphia Feb. 7 after an extended illness. He also was at one time head of the North-East Coal Co., with operations at Thealka and Auxier, Ky., besides having other coal interests.

T. J. O'Brien, president, Kemmerer

DISHING IT OUT



Better than most, mining men know that "Built like a Mack Truck" means built to take it and dish it out. Built to stand up under the smashing jar of heavy ore dropped from a 6-ton shovel, and to haul that ore out day after day after day. For 44 years, Macks have been built to work. They have been given the extra strength and ruggedness that work calls for . . . and these Mack qualities are paying off today in the way a Mack keeps working . . . on schedule and at lowest cost!

Mack

TRUCKS
FOR EVERY PURPOSE
ONE TON TO FORTY-FIVE TONS

BUY U. S. WAR BONDS

Mack Trucks, Inc., Empire State Building, New York, N. Y. Factories at Allentown, Pa.; Plainfield, N. J.; New Brunswick, N. J. Factory branches and dealers in all principal cities for service and parts.

IF YOU'VE GOT A MACK, YOU'RE LUCKY . . . IF YOU PLAN TO GET ONE, YOU'RE WISE!

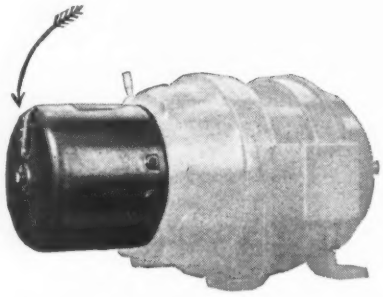
STOP THAT MOTOR! WITH Stearns MAGNETIC BRAKES

Don't waste valuable production hours with over-running motors and machinery! Put Stearns Magnetic Brakes on the job.

If you have a stopping problem on rotating machinery, investigate the smooth, fast braking offered by Stearns Magnetic Milwaukee.

We'd like to tell you about some of the many successful motor and machinery manufacturers who have for years been specifying Stearns brakes, proof of their dependability, right design and construction.

Ask for our Brake Bulletin 604.



The magnetic brake with the lining wear indicator and manual release —distinctive, original.

Stearns SEPARATORS • ROLLS • DRUMS CLUTCHES • PULLEYS • SPECIAL MAGNETS

MAGNETIC MFG. CO.

661 S. 28th St., Milwaukee 4, Wis.

Coal Co., Frontier, Wyo., and vice-president, Gunn-Quealy Coal Co., Quealy, Wyo., died Feb. 9 of a heart ailment in a Salt Lake City hospital. Long prominent in the coal industry, he was for nine years president of the Southern Wyoming Coal Operators' Association and was chairman of District Board 19 throughout its existence.

WILLIAM MACK ELDERS, 60, division superintendent of the southern Illinois group of Peabody Coal Co. mines, died Jan. 22 as the result of an automobile-train accident Jan. 17. He was a long-term employee of the company.

L. H. SMITH, general manager, Nokomis Coal Co., Hillsboro, Ill., died Feb. 14 of a heart attack. Mr. Smith, who was in his sixties, had formerly been associated with the Spring Valley Coal Co. as general manager and was at one time connected with the Midvale Coal Co.'s Chicago office.

•

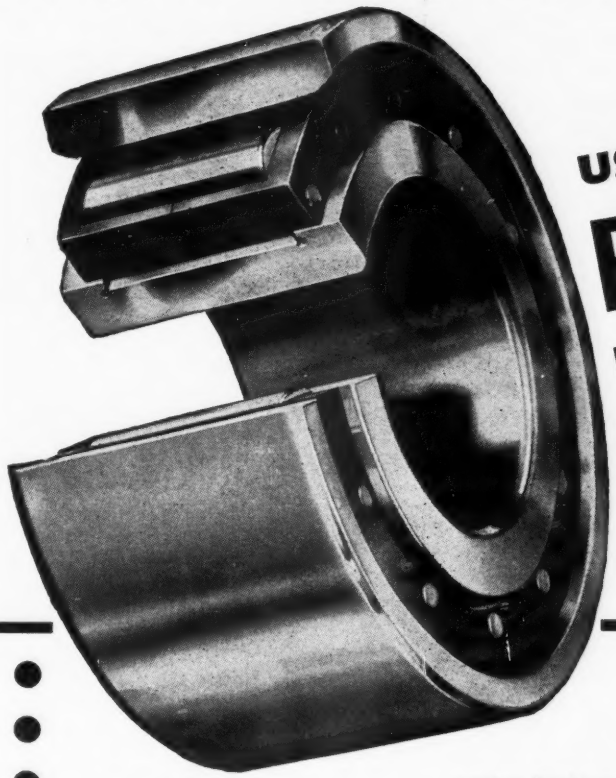
Coal Situation Mixed in Canada

Canada's coal situation is in a contradictory state, with manpower still inadequate in the Maritime Provinces while mines in the West are on slack time because of shrinking demand due to mild weather. In six months following national selective service measures to obtain more coal miners, 1,100 additional men were employed in Maritime Provinces mines, according to R. P. Harley, regional superintendent, Unemployment Insurance Commission. The total still is insufficient, said Mr. Harley, immediate requirements calling for 1,166 more miners in the Maritime Provinces and 2,148 for Canada as a whole. To meet this situation, Defense Headquarters has extended to Aug. 1 its restriction against enlistment in the armed forces of coal-mine workers unless by permission of a National Selective Service officer.

On the other hand, six mines in the Drumheller field of Alberta have suspended operations because of shortage of orders due to mild weather and failure of the government to reopen eastern markets to western producers. Mines in the Lethbridge field also are on slack time, colliery officials saying the miners in that area will be lucky if they work more than three days a week. With some of the smaller mines of the district closed for ten days or more and larger mines working off and on, because of lack of orders, unemployment insurance payments had begun, it was reported Feb. 26. About 700 miners applied for benefits.

G. T. Richards, president, Drumheller Coal Operators' Association, said Feb. 2 the situation would become grave within 30 days unless eastern markets were made available. E. J. Brunning, Dominion Coal Controller, said it is impossible for the government to reopen markets in Ontario at present because of the transportation situations. These facilities, he said, are completely occupied with the movement of war materials. The only solution to surplus of coal in western Canada, said

Design Now for Higher Hourly Production After the War



Type MCS
Double Width

use ROLLWAY Right-Angle BEARINGS to Carry the Load...

Production rates per man and machine-hour rose sharply after the last war. They'll go higher after this war. That's why postwar machines MUST be designed for heavier loads and higher speeds. And that's why the greater load capacity, the longer bearing life, and the lower maintenance costs of Rollway Right-Angle Roller Bearings are vitally important to your postwar designs, right now.

Rollway Right-Angle Loading Reduces the Unit Load

For compound loads, diagram shows how SEPARATE radial and thrust bearings are used in combination:

- **All radial loads carried at right angles to the roller axis**
- **All thrust loads carried at right angles to the roller axis**

Right-Angle loading limits the load carried by each bearing to a single, simple load component—*either pure radial or pure thrust*. Thus the unit load per roller is lower, the load capacity for a given dimensional limit is higher. No oblique loads or resultants, no other compound loads can pile up to increase the magnitude of the simple radial or thrust component. Resistance to shock and vibration is increased. Pinch-out of rollers is eliminated—there's less rubbing friction, and less wear-back of roller ends. The net gain is clearly apparent in longer bearing life and lower maintenance cost.

Standard Sizes for Most Applications

S.A.E. or American Standard metric dimensions and tolerances in a wide range of sizes and types assure low cost and ready availability for most applications. Special designs are rarely necessary. Let our engineers help you select the types best suited to your needs. Just send a drawing or detailed description for free, confidential analysis and recommendation. No obligation.

ROLLWAY BEARING COMPANY, INC., SYRACUSE, NEW YORK

BUILDING HEAVY-DUTY BEARINGS SINCE 1908 **BEARINGS**

Trade Mark... "Dustributor"

Making "dustributors" for so many years, this company has brought the work of mine dusting to the highest state of perfection with its several models of "dustributors". The "Mighty Midget" was designed particularly for work at the mine face and for quick conveyance on coal cars, shuttle cars, from point to point where immediate dusting is needed to assure safety. Let us demonstrate this "Mighty Midget Dustributor" in your mine. It will quickly pay for itself. It will demonstrate that American Mine Door dusting is the kind you need for economical safety.

"Mighty Midget" Specifications

Overall Length 45"
Motor 2 h.p.
Motor r.p.m. 3450
Hopper Capacity—1 sack 80 lbs.
Dust Delivery 34 lbs. per min. (ton per hour)
Overall Width 22"
Overall Height 18½"
Weight, Net 280 lbs.
Shipping Weight 300 lbs.
Static Pressure 11.4 inches.

Machine and cart are separate units.

American Mine Door Co.
2057 Dueber Avenue — Canton 6, Ohio

GRUENDLER CRAFTSMANSHIP...
Employed by Coal Producers

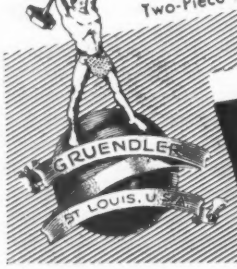
SPECIFIC SIZES of COAL

- LUMP, EGG, NUT or STOKER SIZES produced with a minimum of fines, using low power by the GRUENDLER CRUSHER method.
- A crusher utilizing small space and accomplishing new highs in coal production.
- GRUENDLER builds a complete line of coal crushing equipment includes both single and double roll crushers. Bulletins sent on request.

Patented... TWO-PIECE HAMMERS or RING HAMMERS

Ring Hammer

Two-Piece Hammer



GRUENDLER
CRUSHER and PULVERIZER Company
St. Louis, Mo.

the Controller, is for consumers in the western provinces to build up stockpiles. He urged purchasing coal now for next winter.

A committee of western Canadian operators set out for Ontario Feb. 11 to see if some arrangement could be made to prevent closing of most of the mines in Alberta. It was foreseen that such an arrangement probably would cut off some shipments from the United States. Miners' union executives of District 18 also are putting pressure on eastern markets to help the western situation.

The National War Labor Board has granted a wage increase of $1 a day and one week's vacation with pay to employees of smaller mines in Nova Scotia and New Brunswick. Increases already had been allowed in major Nova Scotia mines after a Royal Commission had granted similar boosts in Alberta and British Columbia.

C. D. Howe, Minister of Munitions and Supply, on Feb. 22 announced the lifting of restrictions on the use of heavy, or bunker, fuel oil in all provinces of the Dominion except British Columbia.

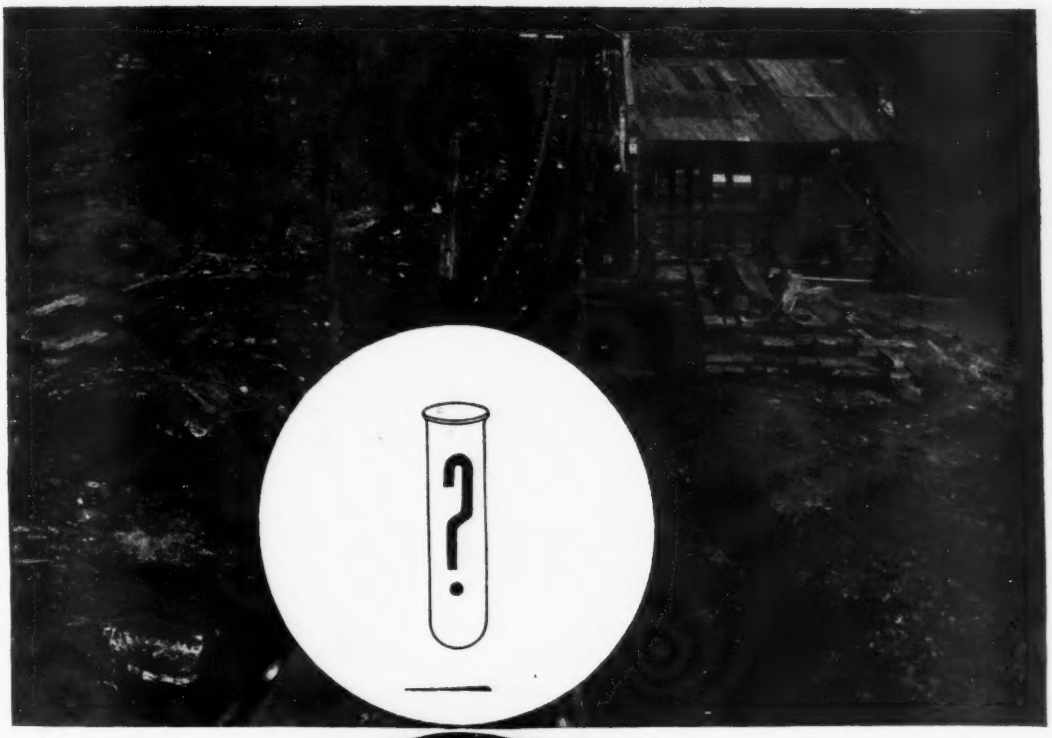
The Wartime Prices and Trade Board has announced that increases in the prices of lignite produced in Saskatchewan ranging from 10 to 30c. per ton have been authorized by Coal Administrator Brunning. The boosts are the result of wage increases granted to miners by the National War Labor Board. C. D. Howe, Munitions Minister, stated that restrictions placed last November on delivery of coal have been suspended in the four western provinces because of the lighter demand for coal for household use due to mild weather.

•

Strip-Shovel Growth Traced for 100 Years

The evolution of strip shovels over the last 100 years was the topic of L. E. Blanchett, electrical engineer, Bucyrus-Erie Co., Milwaukee, Wis., at the February meeting of the Southern Illinois Mining Electrical Group, West Frankfort, Ill. The early steam drive, said the speaker, has practically disappeared in favor of diesel engines for many industrial applications, and electric power for a large percentage of mining installations. Beginning with series motors, shunt motors were substituted to get smoother control. Then followed schemes to overcome the sluggish response to control current of large generators and motors, among them increasing the resistance portion of the exciter circuit. This burned up some electric power but gave the control faster action.

Evolution in the design of generators and motors for shovel service includes long, small-diameter armatures and higher speeds, which aid in reducing WR^2 values. This reduces the mechanical resistance to changes in speed necessary to get rapid reversal of motion with a minimum of mechanical shock to the shovel and its equipment. The reduction in bulk of frames and of heavy copper in field windings are both effective in reducing electrical inertia and increasing speed change reversal of effective excitation. Resistor-con-



LABORATORY TESTS SAY *YES*

A most important item in the mechanization program in the Coal Industry is the Rubber Conveyor Belt.

Prior to Pearl Harbor, when generous quantities of Crude Rubber were available, we knew what service a Quaker Conveyor Belt would give because so many were in use under actual working conditions that day after day, month after month, extending to year after year, they were giving service that brought the cost per ton of material conveyed down to the bottom figure.

But, what about Belts from All-American (Synthetic) Rubber?

Gruelling laboratory tests now say: "Yes". Sufficient time has not yet elapsed to get the answer what All-American Rubber Belts will do. We have the utmost confidence that Quaker All-American Belts now in actual use will confirm what the laboratory now tells us.

You can order your Belt today, as well as other Industrial Rubber Products, with complete assurance of receiving finished material that will give you the service you expect.

Quaker Products, made from Crude Rubber or All-American Rubber (Synthetic) are the best the Rubber Manufacturing Industry can offer.

If there is a way to get it done—Quaker will do it.

QUAKER RUBBER CORPORATION

PHILADELPHIA 24, PA. • NEW YORK 7 • CLEVELAND 15 • CHICAGO 16 • HOUSTON 1

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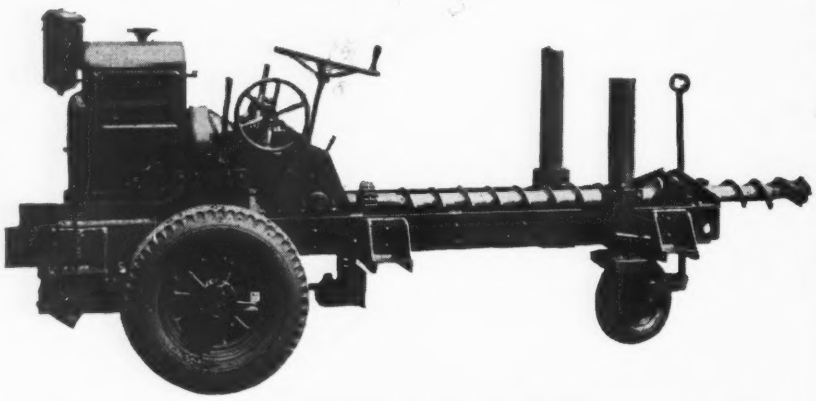
PARMANCO Horizontal Drills

"Positive Control Drilling"

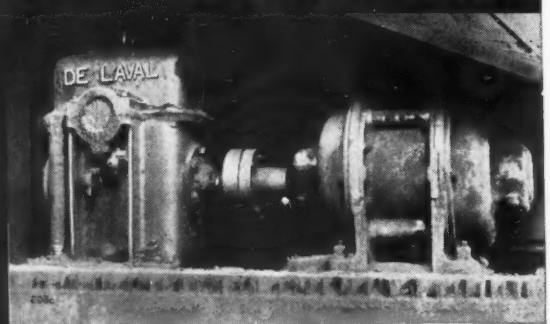
Parmanco Horizontal Drills give you "Positive Control Drilling." Parmanco Vertical and Horizontal Drills are today's leaders in low cost, low maintenance drilling—All Parmanco Drills are equipped with patented Parmanco augers. Used by leading strip mine operators—Write us your drilling problems.



PARIS MANUFACTURING CO.

PARIS, ILLINOIS

for CONTINUOUS PRODUCTION



De Laval worm gear driving coal conveyor

Breakdowns in power transmission in 24-hour plants are eliminated where plant engineers specify the

DE LAVAL WORM GEAR

for heavy duty drives, particularly in locations involving exposure to grit, dust and moisture.

The two moving parts of the gear run in a bath of oil and it is self-lubricating, requiring no attention beyond inspection of the level in the oil well at long intervals.

The unit does not throw grease or oil.

Safety guards are unnecessary, as the working parts are enclosed.

The efficiency is high, and improves with use.

The drive is smooth and quiet. It is also positive; there is no slippage, regardless of starting torque.

Describe conditions. Ask for Publication W-1132.

DE LAVAL WORM GEAR DIVISION
of the De Laval Steam Turbine Co., Trenton, N. J.

trolled machines have now given way to the more economical and smoother functioning Ward Leonard system, in general use.

The more recently developed "Amplidyne," double Ward Leonard and "Rototrol" control devices, with their smooth, high-speed response, are now being applied to further alleviate the inherent sluggishness of large machines. This also means that overshooting and excessively high stall currents may be brought under control to an extent that materially reduces mechanical maintenance.

Other results are somewhat higher speed of operation and consequent increase of yardage moved, indefinite life of control devices, due to the extremely small current handled, and lower operator fatigue because of miniature control devices.

"We do not yet have sufficient experience to say that one or the other of these devices is the best," Mr. Blanchett stated. "In the light of present information and experience, there are conditions where either might be chosen in preference to the other." Discussing further the question of "Will it pay to apply an amplidyne to an existing shovel?" Mr. Blanchett said: "I do not know; probably it will. It will depend on the probable life of the mine and other conditions. It costs quite a bit of money."

Attention was called to a common complaint of shovel runners that the machine "loses power" when the generators and motors get heated up to normal running temperature. "The machine is rated for that normal condition," said Mr. Blanchett. Major electrical manufacturers have devices for overcoming the change of "pep" from the cold to the hot condition of the machine. By their use the running of the machine is the same whether cold or hot.

•

Preparation Control Stressed by Chemists

Preparation control was the subject of the January meeting of Illinois Preparation Engineers and Chemists, held at the Benton Country Club, with two members conducting the program as the principal speakers. They were Ray Bridges, chemist, Southwestern Illinois Coal Corp., Percy Ill., and Paul Moran, preparation engineer, Binkley Mining Co., Seeleyville, Ind.

"The technique of sampling for the laboratory is highly important, because the object of the laboratory is to make representative analyses of the output of the mine," said Mr. Bridges. Apparently American Society for Testing Materials methods with its samples of "1,000 times the weight of the largest piece of refuse" are too slow and cumbersome for prompt reporting and the control of a coal washery. Therefore proximate methods, where speed of reporting is possible, are favored for plant control.

Sliced samples are much preferred to grab samples as likely to be more representative. One object is to keep errors within certain limits. Mr. Bridges declared that after a chemist has been at a given mine for a while he learns what

You Can Deliver Dusty Coal to Your Customers But You Can't Make Them Like It

Public opinion can make or break any political party, business or social group. Postwar commercial changes will be greater than ever before in our history. Many changes will be dictated by pent-up public opinion now forced to tolerate unnecessary hardships.

So the coal industry, now in position to get away with any kind of coal it wants to deliver, might well look to the future and ask itself, "What judgment will public opinion give us after the war?" Will it readily forget the unnecessary dirt and cleaning expense caused by dusty untreated coal, or will its resentment turn it to other fuels at the first opportunity?

Many coal dealers now realize they can deliver dusty coal, but they can't make people like it. So they order coal dust-treated at the mine, to retain the old and to secure new business. Bulletin 37 tells how to dustproof coal with clean, odorless Calcium Chloride. This Bulletin is available on request. Calcium Chloride Association, 4145 Penobscot Bldg., Detroit 26, Mich.

DUSTPROOF COAL AT THE MINES WITH

CALCIUM CHLORIDE

▾ WILMOT BUILDS BETTER BREAKERS ▾

Speed, Efficiency and Economy

IN COAL PREPARATION

Aid in Offsetting the Increasing Cost of Production

By reducing the cost of preparation and increasing the net yield, Wilmot "Hydrotators" convert high cost production into profits. These superior coal cleaning units maintain uniformly high quality standards by a preparation process that is accurately regulated and automatically controlled to achieve maximum cleaning efficiency.

WILMOT
A GREAT NAME IN THE COAL INDUSTRY

HYDROTATOR *Preparation* EQUIPMENT

WILMOT ENGINEERING COMPANY, HAZLETON, PA.

GOOD VENTILATION *is a* VITAL FACTOR *in* PREVENTING GAS *and* DUST EXPLOSIONS

Play Safe WITH AMERICAN BRATTICE CLOTH!

● Clean, clear air at the working face is of genuine importance to you from a standpoint of production *and* safety. Fouled air causes rapid fatigue, a corresponding drop in coal output . . . and creates a definite safety hazard.

AMERICAN Brattice Cloth will help eliminate this hazard to the safety and efficiency of your operations by routing air past "dead ends", to the working face. This material is specially treated, abrasion, fire and fungus-proof and may be moved from one cross-cut to another . . . used again and again.

Write today . . . our large factory stocks permit fast delivery!

American BRATTICE CLOTH CORPORATION
WARSAW, INDIANA
Agencies in all Mining Centers

to expect from the various fractions of coal and can promptly decide if any particular analysis is so far out of line as to be discarded. While speed is the essence of washery operations, Mr. Bridges would use A.S.T.M. methods if he represented a buyer.

"The laboratory is the gage of plant operation," said Mr. Moran, who gave at least five basic rules for washery operation. Because all plants are now running overloaded, because of war demands, observation of these rules is of more than customary importance:

1. Uniformity of product is the watchword—even more important than ash content—so the plant burning the coal can regulate operation.

2. Basic principles of the use of coal must be understood by the washery operator, such as a constant supply at a uniform rate and that uniform poor coal is better than an indiscriminate supply of varying sizes. Size is as important as quality; it promotes good fire control.

3. There are 420 minutes in a day. Delays play hob with sizing and mixing and they cut production. They must be eliminated to keep grades uniform.

4. Plant maintenance is important now. If the various washery units are not all in condition, there are irregularities in the product.

5. The Baum jig may have several percent difference in ash when slate is discharged in wads. Continuous draw gives better average and lower ash. The customer wants uniformity of ash.

"There are three methods of washery control," declared Mr. Moran: visual, sink-and-float and ash-content. Observation is easy, sink-and-float is tedious but essential, and ash is the customer's viewpoint. While the customer is interested in ash and B.t.u., the washer is a sink-and-float machine, and sink-and-float determinations are necessary to establish its operation. The trend is to sell so many millions of B.t.u. rather than so many tons of coal.

Speaking of the laboratory, said Mr. Moran, "High-speed methods are necessary. Some things may have to be sacrificed. There should be more machines and fewer men, and the laboratory should be on the downtrack side."

•

Coal Publications

Applied Safety Engineering, by H. H. Berman and H. W. McCrone. McGraw-Hill Book Co. 18 pp., 5½x8½ in.; cloth; $2. Safety engineering is a science but scientists don't lead. This book shows the safety man how to get his ideas over to the man on the job.

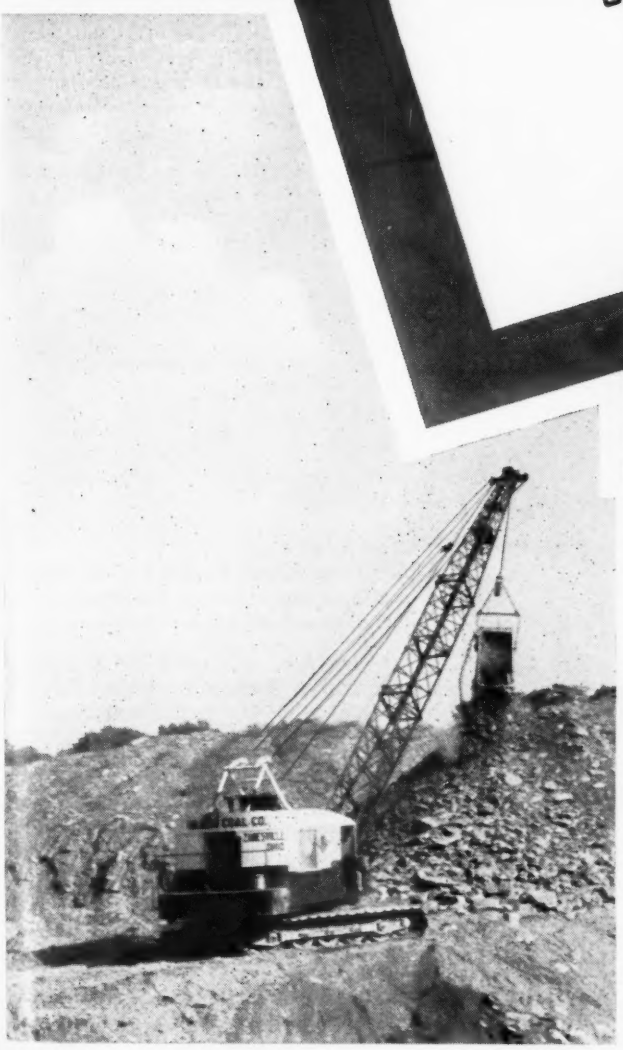
Fuels of the Future, by Ralph Sherman, Battelle Memorial Institute. 28 pp.; 8½x11 in.; mimeograph. Coal should oust oil and natural gas from comfort heating, steam generation and metallurgical processing. Oil should be restricted to use as motor fuel and to navy.

Carbonizing Properties and Petrographic Composition of Thick Freeport Bed From Harmar Mine, Harmarville, Pa., and

WE ARE NOT MAKING AS MANY CALLS AS WE DID —

LIMA

LIMA LOCOMOTIVE WORKS, INCORPORATED
SHOVEL AND CRANE DIVISION
LIMA, OHIO



but we want you to know that we are still on the job building Cranes, Shovels and Draglines without precedent, most of them earmarked for the "Armed Forces". With Uncle Sam demanding the greater part of our output and the fact that many of our sales representatives and service men have answered the call to the colors, while others are now procuring and expediting materials, we have been unable to make as many calls as we would like to on our friends and customers.

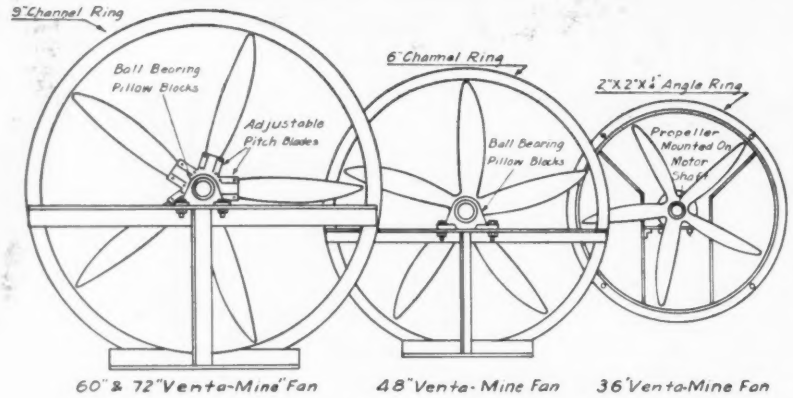
We miss those friendly contacts and opportunities to serve you. Let us hope that it will not be long before we can see you regularly and give your excavator needs our undivided attention. Your patience has been magnificent when we have had to say "no" when you needed that new LIMA so badly, but we know that you like ourselves have but one thought in mind—VICTORY and until then the armed forces must continue to have preference.

LIMA LOCOMOTIVE WORKS, INCORPORATED
Shovel and Crane Division - - - - - - - LIMA, OHIO

NEW YORK, N.Y. · PHILADELPHIA, PA. · NEWARK, N.J. · MEMPHIS, TENN.
SAN FRANCISCO, CALIF. · DALLAS, TEXAS · PORTLAND, ORE. · LOS ANGELES, CALIF.
SEATTLE, WASH. · SPOKANE, WASH. · MINNEAPOLIS, MINN. · ST. LOUIS, MO.
MONTREAL, Quebec, Can. · VANCOUVER, B. C.

LIMA SHOVELS CRANES . DRAGLINES

SHOVELS, ¾ YD. TO 3½ YD. CRANES, 13 TONS TO 65 TONS
DRAGLINES, VARIABLE



60" & 72" Venta-Mine Fan 48" Venta-Mine Fan 36" Venta-Mine Fan

"VENTA-MINE" Ventilating Fans

FIVE STAR QUALITIES

★ High All Around Efficiency
★★ Simplest Possible Construction
★★★ Replaceable Ball Bearing Pillow Blocks
★★★★ Lightweight Aluminum Propeller Blades
★★★★★ Double Extension Shaft

PERFORMANCE CHART:

Capacities in thousands of cubic feet per minute vs inches of water pressure.

Size	H.P.	RPM	Static Press. Free Air	.1"	.2"	.3"	.4"	.5"	.6"	.7"	.8"	.9"	1.0"	1.1"	1.2"
36"	2	1750	165	155	140	130	115	105	90	74	55	35			
48"	5	1150	300	284	260	230	190	150	105	65	20				
48"	10	1750	490	470	445	420	400	375	340	320	290	265	240	220	180
60" LOW PITCH	7½	1150	410	400	390	370	345	310	270	230	190	145	100	50	
60" HIGH PITCH	15	1150	840	830	820	800	780	745	710	670	630	570	500	425	350
72"	20	900	1003	960	930	890	850	810	780	740	695	650	600		
72"	25	900	1105	1080	1050	1000	970	940	890	850	810	770	730		

GUYAN MACHINERY CO., LOGAN, W. VA.

P-G Automatic TRANSFER SWITCH

PROMOTES Safety AND INCREASES PRODUCTION

Eliminates hand switches—entirely automatic. No shocks or burns to operator while changing from trolley to reel or vice versa. Simple, safe, efficient, easy to install, can be mounted anywhere. For 250 or 550-volt service in single or double trolley and reel. Complete with cover.

THE POST-GLOVER ELECTRIC COMPANY
• ESTABLISHED 1892 •
221 WEST THIRD STREET, CINCINNATI, 2 OHIO

Effect of Blending With Pocahontas Coals, by J. D. Davis, D. A. Reynolds, G. C. Sprunk, C. R. Holmes and J. T. McCartney, U. S. Bureau of Mines. Bull. 655; 46 pp.; paper.

Tentative Bituminous and Lignite-Mine Inspection Standards, Revised, September, 1943. U. S. Bureau of Mines, I. C. 7268. 54 pp.; mimeograph.

Air Flow at Discharge of Fan—Pipe Lines in Mines; Part II—Effect of Size and Shape of Pipe and of Adjacent Walls on Velocity and Entrainment Ratios, by G. E. McElroy, U. S. Bureau of Mines. R. I. 3730. 41 pp.; mimeograph.

How to Create Job Satisfaction, Elliott Service Co., 58 pp., 5⅜x7¾ in. Explains the correct start and the features that make the job desirable.

Application of Rosin-Rammler Law to the "Missing Sizes" in Screened Coal, by G. S. Scott, U. S. Bureau of Mines (whom please address). I. C. 3732; 13 pp.; mimeograph. How to determine what percentage of sizes will be obtained if screens with larger or smaller openings are used.

Tests of the Heliopore Coal-Carbonization Power-Plant Process, by A. C. Fieldner, J. D. Davis, V. F. Parry, L. D. Schmidt, J. L. Elder, J. B. Goodman, W. S. Landers and E. W. Goodwin, U. S. Bureau of Mines (please address). R. I. 3733; 62 pp.; mimeograph. Declares heat economies obtained by utilizing engine exhaust gas for coal carbonization will not justify any appreciable investment in special equipment.

Grounding Electrical Equipment in and About Coal Mines, by F. E. Griffith and E. J. Gleim, U. S. Bureau of Mines (please address). R. I. 3734 mimeograph. Grounds necessary to prevent shocks and premature shots. Mere machine contact or a single peg in ground inadequate. Conductor to bonded track recommended.

Active List of Permissible Explosives and Blasting Devices Approved Previous to June 30, 1943, by J. E. Tiffany and Z. C. Gaugler, U. S. Bureau of Mines (please address). R. I. 3736 23 pp.; mimeograph. 180 brand names. No more than 1½ lb. of explosives per hole are permitted for safety.

Modern Beehive Coke Oven Practice (I—Preliminary Report), by G. A. Scott, J. A. Kelley, E. L. Fish and L. D. Schmidt, U. S. Bureau of Mines (please address). R. I. 3738; 19 pp.; mimeograph. Data on coke-oven temperatures, exit gases and coal quality.

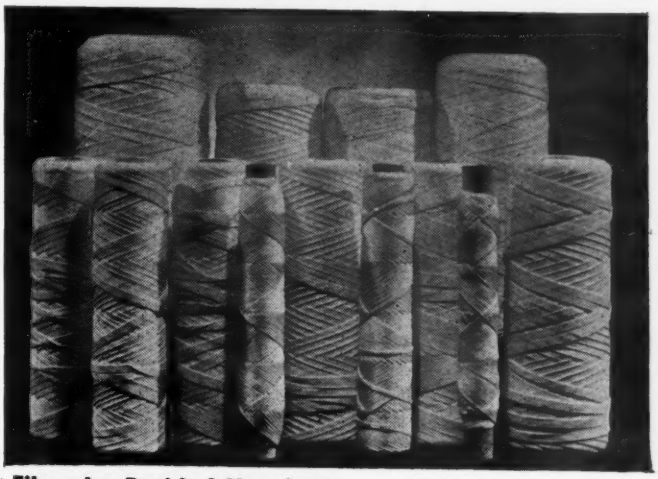
Precision of the Volatile-Matter Determination of Anthracite, Low-Temperature Coke and Subbituminous Coal, by W. A. Selvig, U. S. Bureau of Mines (please address). R. I. 3739; 6 pp.; mimeograph. Permissible variations of volatile matter should be 0.3 for anthracite. 0.5 for low-temperature coke and 0.7 for sub-bituminous coal in duplicate determinations by same laboratory on same sample of fuel.

Control of Sulphur and Ash in Mine-Run Metallurgical Coal; Report 1, by H. E. De Kay Jr., L. A. Turnbull, J. N.

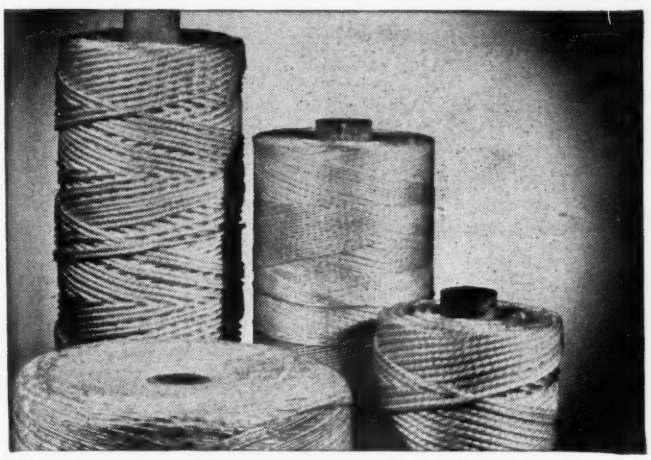
FIBERGLAS* ELECTRICAL INSULATION NOW AVAILABLE!

(Increased Fiberglas Production permits this Announcement to be Made)

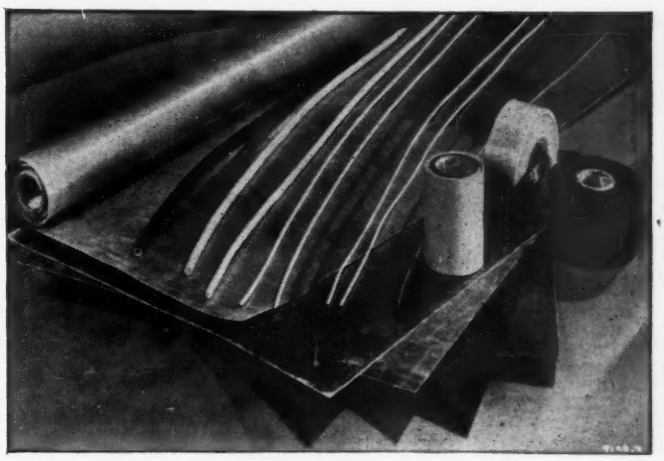
Fiberglas Tapes available in all widths and thicknesses from .003" to .015".



Fiberglas Braided Sleevings.



Fiberglas Tying Cords both treated and untreated.



A few of the many types of Fiberglas fabricated materials, including Fiberglas cloths, tapes, and tubings; Fiberglas-mica combination material and Fiberglas laminated sheets.

Not pictured but also available are: Unprocessed yarns, varnished tapes, cloths, sleevings, and saturated sleevings.

Owens-Corning Fiberglas Corporation, Toledo 1, Ohio.
Fiberglas Canada, Ltd., Oshawa, Ontario.

FIBERGLAS*
*T. M. Reg. U.S. Pat. Off.

ELECTRICAL INSULATION

ARMY (E) NAVY

Get in Touch with Your Electrical Distributor Now! . . . Fiberglas Materials are in stock for immediate delivery!

EARL B. BEACH COMPANY
Pittsburgh, Pa.

ELECTRICAL SPECIALTY COMPANY
Seattle, Washington

GENERAL ELECTRIC SUPPLY COMPANY
Buffalo, New York
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GRAYBAR ELECTRIC COMPANY, INC.
Philadelphia, Pa.
Richmond, Va.

WHITE SUPPLY COMPANY
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INSULATION AND WIRES, INC.
Atlanta, Ga.
Cambridge, Mass.
Detroit, Mich.
St. Louis, Mo.

INSULATION MANUFACTURERS CORP.
Chicago, Illinois
Cleveland, Ohio
Minneapolis, Minn.

LEO J. MEYBERG COMPANY
Los Angeles, California
San Francisco, California

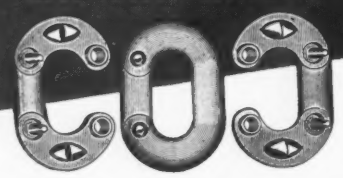
MICA INSULATOR COMPANY
Chicago, Illinois
Cleveland, Ohio
New York, N. Y.

MITCHELL-RAND INSULATION COMPANY
New York, N. Y.

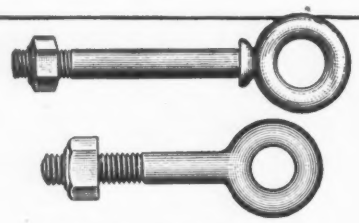
NATIONAL ELECTRICAL COIL COMPANY
Columbus, Ohio
Bluefield, West Virginia

PREHLER ELECTRICAL INSULATION COMPANY
Chicago, Illinois
Cleveland, Ohio

HERE'S A LINK
FREE FROM PLAY
OR
SHEARING ACTION
ON THE RIVET

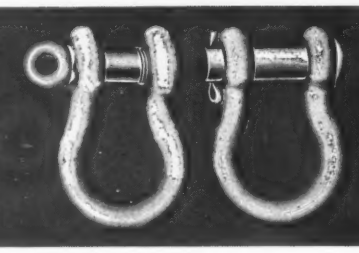


Laughlin's drop-forged, heat-treated "Missing Link" is matched under pressure . . . so there is no play between the halves, no shearing action on the rivet. Under stress, the rivet merely holds the missing link together. The interlocking lugs take the load.



WIDE RANGE OF EYE BOLTS

Laughlin's drop-forged, weldless eye bolts are available in any length or diameter, with or without thread or shoulder. Galvanized or Plain. Stock sizes: ¼" x 2" to 1¼" x 20".



SHACKLES MADE TO
U. S. GOVERNMENT TOLERANCES

Drop-forged steel, weldless anchor shackles, made in all sizes from 3/16" to 2½". Can be furnished with either screw pin, round pin or bolt and nut. Galvanized or Plain-finish.

Write for latest Catalog on Laughlin Industrial Hardware

Distributed through
Mill, Mine, and Oil Field Supply Houses
Look for Laughlin Products in Coal Mining Catalogs

FORGING A SHARE IN VICTORY

THE THOMAS LAUGHLIN Company
PORTLAND 6, MAINE

Scudder and A. L. Toenges, U. S. Bureau of Mines (please address). R. I. 3742; 46 pp.; mimeograph. Control at source of sulphur and ash in coal to be used for metallurgical purposes. Largely an underground book but covers blending.

Use and Misuse of Flame Safety Lamps, by W. H. Tomlinson, U. S. Bureau of Mines (please address). I. C. 7271; 14 pp. "To make certain that all flame safety lamps are in good condition, they should be tested in explosive gas before being taken underground . . . a difficult job at large operations."

Microdetermination of Volatile Matter in Coal and Coal Products, by Martin Neuworth and W. R. Kirner, Carnegie Institute of Technology. Contribution 111; 6x9 in., 3 pp. Carbonization, sample introduction and sample removal minimize air oxidation.

Significance of the Chemical Nature of Coal, by H. H. Lowry, C. I. of T. Cont. 112; 14 pp. "Studies of the chemical nature of coal have shown that it is the logical source of the many aromatic compounds needed in increasing quantities by the chemical industry."

Determination of Surface Oxidation of Bituminous Coal, by John A. Radspinner and H. C. Howard, C. I. of T. Cont. 113; 13 pp. Plotted logarithmically, the relation between oxidation in hours and oxygen consumed in millimols per 100 grams of coal is almost a straight-line relation.

A Carbonization Pressure Gauge, by M. A. Mayers and J. A. Thompson, C. I. of T. Cont. 114; 10 pp. Describes a gage prepared for observation of the mechanical pressure against a point of the wall of a slot-type coke oven by the charge undergoing carbonization. Pressures are several times as great as average pressures.

•

Mine Fatalities React Downward

Accidents at coal mines of the United States caused the deaths of 75 bituminous and 11 anthracite miners in December last, according to reports furnished the U. S. Bureau of Mines by State mine inspectors.

With a production of 52,600,000 net tons, the accident death rate among bituminous miners in December last was 1.43, compared with 1.56 in the preceding month and 2.04 in December, 1942.

The anthracite fatality rate from accidents in December last was 2.21, based on an output of 4,970,000 tons, against 4.36 in the preceding month and 4.34 in the final month of 1942.

For the two industries combined, the accident fatality rate in December last was 1.49, compared with 1.80 in the preceding month and 2.23 in December a year earlier.

Fatalities during December last, by causes and states, as well as comparable rates for 1942 and 1943, were as follows:

U. S. COAL-MINE FATALITIES IN DECEMBER, 1943, BY CAUSES AND STATES

State	Underground: Falls of Roof	Falls of Face	Haulage	Explosives	Electricity	Machinery	Other Causes	Total Underground	Shaft	Open-cut	Surface	Grand Total
Colorado	..	..	2	..	..	..	..	2	..	..	..	2
Illinois	3	..	4	..	..	..	..	7	..	..	1	8
Indiana	1	..	1	..	..	..	..	2	..	..	..	2
Iowa	..	..	1	..	..	..	..	1	..	..	..	1
Kentucky	7	..	1	..	..	..	..	8	..	..	1	9
Ohio	..	..	2	..	..	..	..	2	..	..	..	2
Oklahoma	..	..	..	1	..	..	..	1	..	..	..	1
Pennsylvania (bituminous)	11	..	4	..	..	..	..	15	..	1	2	18
Tennessee	1	..	..	..	..	..	..	1	..	..	..	1
Utah	2	1	..	..	..	1	..	4	..	..	..	4
Virginia	3	..	1	..	..	..	..	4	..	..	..	4
West Virginia	13	..	3	1	1	..	1	19	1	1	2	23
Total bituminous	41	1	19	2	1	1	1	66	1	2	6	75
Pennsylvania (anthracite)	7	1	1	1	..	..	..	10	..	..	1	11
Grand total	48	2	20	3	1	1	1	76	1	2	7	86

DEATHS AND FATALITY RATES AT U. S. COAL MINES BY CAUSES OF ACCIDENTS*

January-December, 1942 and 1943

Cause	Bituminous: Number Killed		Bituminous: Killed per Million Tons		Anthracite: Number Killed		Anthracite: Killed per Million Tons		Total: Number Killed		Total: Killed per Million Tons	
	1942	1943	1942	1943	1942	1943	1942	1943	1942	1943	1942	1943
Underground:												
Falls of roof and coal	622	591	1.073	1.008	136	113	2.268	1.873	758	704	1.185	1.089
Haulage	254	223	.438	.381	36	38	.601	.630	290	261	.453	.404
Gas or dust explosions:												
Local	20	22	.034	.038	9	1	.150	.017	29	23	.045	.036
Major	127	147	.219	.251	...	14	....	.232	127	161	.198	.249
Explosives	20	27	.034	.046	12	10	.200	.166	32	37	.050	.057
Electricity	50	30	.087	.051	6	1	.100	.016	56	31	.088	.048
Machinery	41	25	.071	.043	1	1	.017	.016	42	26	.066	.040
Shaft	8	8	.014	.013	2	1	.033	.016	10	9	.016	.014
Miscellaneous	33	25	.057	.043	10	11	.167	.183	43	36	.067	.056
Stripping or open-cut	20	22	.034	.038	4	9	.067	.149	24	31	.037	.048
Surface	59	55	.102	.094	12	20	.200	.332	71	75	.111	.116
Grand total	1,254	1,175	2.163	2.006	228	219	3.803	3.630	1,482	1,394	2.316	2.157

*All figures subject to revision.

One of seven 1800' B-G Belt Conveyors totalling 12,000 feet going into production in a large western coal mine.

CONTINUOUS STREAM OF COAL TO MEET ALL-TIME PRODUCTION PEAKS IN 1944

Modern armament has vastly multiplied the firepower of the soldier. Modern mine equipment has vastly multiplied the efficiency of the miner—freed him for work a machine cannot do.

Truss type belt conveyors for underground hauling, pioneered by Barber-Greene, have solved many transportation problems, are helping to meet peak quotas in 1944. B-G standardized frames, carriers, drive ends and takeups, permit extreme flexibility, low maintenance costs, maximum hauling ability.

Perhaps your mine can utilize this smooth, continuous flow of coal. Write to the Mining Dept., Barber-Greene Co., Aurora, Ill., U. S. A., for complete information.

44-61

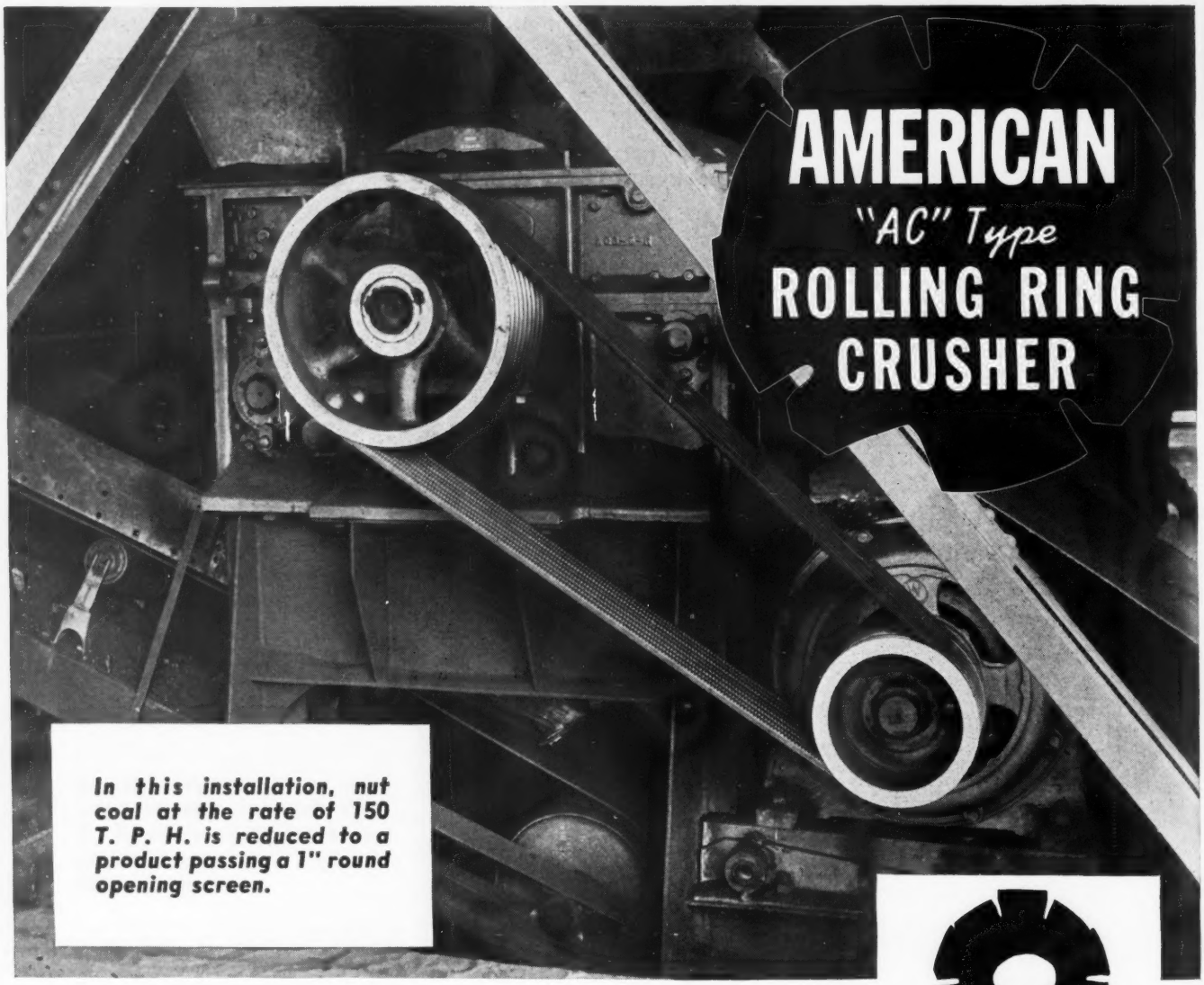
ARMY E NAVY

AURORA, ILLINOIS

BARBER-GREENE

BUY WAR BONDS — NOW!

SPLITS THE COAL GIVING YOU...
Uniform Size - Large Tonnage - at low per ton cost



In this installation, nut coal at the rate of 150 T. P. H. is reduced to a product passing a 1" round opening screen.

• Its dependable operation saves on maintenance.

The splitting action of our patented Manganese Steel Shredder Rings reduces fines to a minimum—the coal is split instead of being crushed. You get greater range of reduction.

Another result of this splitting action is a reduction of power requirements to a remarkably low figure.

Coal is split instead of crushed
Reversible Manganese Steel Shredder Rings
reduce fines to a minimum

This splitting action of the SHREDDER RINGS shatters and distributes the coal before it reaches the Breaker and Grinding Plates.

These patented reversible manganese steel SHREDDER RINGS are found only in the American Rolling Ring Crusher. They have twenty cutting edges or teeth and are designed to maintain their outward position by centrifugal force at the specified speeds. In contact with solid metal, the rings are momentarily deflected from their usual course because they are free to swing back out of position. There are no shear pins or other safety devices that require attention.

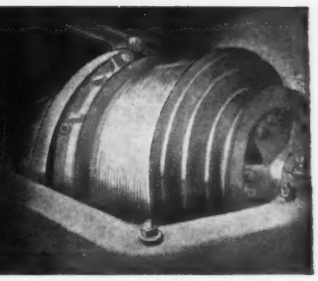
It costs less than one cent a ton including all costs to reduce bituminous coal from lump to stoker size. You realize greater speed in producing stoker coal sizes.

Simplicity of construction and operation—accessibility at all times and real flexibility on the job all point to economy for you. External adjustment—compact design. Each unit arranged to meet the particular requirements of each installation.

AMERICAN PULVERIZER COMPANY 1119 MACKLIND AVENUE ST. LOUIS, 10, MISSOURI

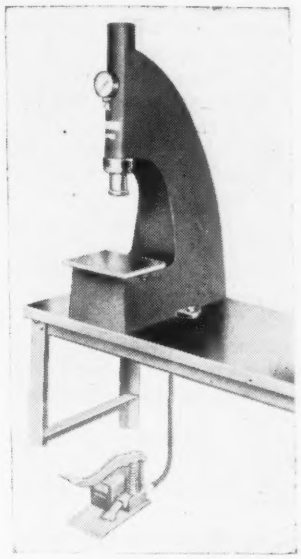
ORIGINATORS AND MANUFACTURERS OF RING CRUSHERS AND PULVERIZERS

TIPS FROM MANUFACTURERS



Hydraulic Press

All-steel construction and simplified hydraulic foot control are cited as outstanding features of the new press manufactured by Reimuller Bros. Co., 9400 Belmont Ave., Franklin Park, Ill. This Hy-Speed gap-style unit is designed for speedy and



efficient handling of assembling, broaching, grooving, riveting, sizing, straightening, marking, forming and scores of other small-press operations. It is made in 10- and 20-ton models with 50 percent overload capacity.

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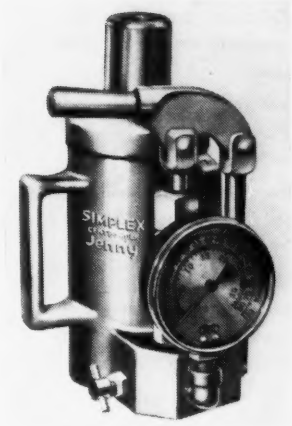
Hydraulic Puller

The Simplex-Jenny center-hole hydraulic puller is offered by Templeton, Kenly & Co., Chicago, to accomplish in minutes production, maintenance and repair jobs which normally require hours, the company states. Applications include pulling bushings, cylinder liners, cutless bearings, pistons, wrist pins, valve seats, keys, wheels, sprockets, gears, boiler tubes and pipes. It also is used to pull structural members together for welding or riveting.

The Simplex Jenny pulls, pushes or lifts, and can also be readily rigged up as a portable press. This self-contained unit operates vertically or horizontally without the need for heavy auxiliary equipment and without side thrust or friction. The Jenny is its own back-up and is self-supporting because of its center-hole construction.



Five models are available in 30 to 100 tons capacity. The light weight of the complete unit in proportion to its capacity is cited. Three models have single pumps and two have high- and low-speed pumps which may be operated separately, alternately or together. Alloy steel rods are recommended, as the Simplex Jenny will stretch, collapse or pull apart any mild-steel rod that will fit through the center hole. The unit is built of heat-treated alloy steels to withstand heavy loads and service abuse. Bulletin 43J, describing the puller, will be mailed on request.

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Belting

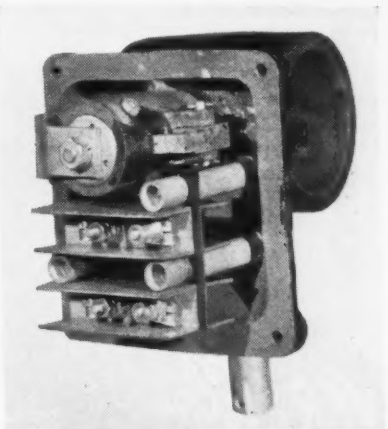
Belting made with the new synthetic rubber from government plants, known as GR-S synthetic rubber, can be joined to natural rubber belting with a vulcanized splice, according to the B. F. Goodrich Co., Akron, Ohio. This makes it possible to use sections of the new GR-S synthetic belting to repair existing belting when needed. The company's standard splicing and repair materials can be used with the new GR-S synthetic belting, using the same directions given in the Goodrich manual on repairing and splicing belting.

•

Cable Guide

For many years the mining industry has needed a device to eliminate overrunning of cable reels on trolley-reel locomotives. Many solutions were offered, but all of them were found to be inadequate or too complex or expensive. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., according to E. D. Reiber, application engineer, transportation and generator division, has introduced a new cable guide which should eliminate most of the troubles encountered as a result of pulling the cable from the reel. It is mounted in the same manner as any standard guide and requires little additional space. It is suitable for open locomotives or those of the explosion-tested type.

At a predetermined distance from the reel a fiber block is bolted to the reel cable. If the locomotive is operated past this point the fiber block "knocks out" a metal core. As this core leaves the guide a spring-loaded plunger opens a cam switch inside the case. This cam switch is connected in series with the operating coil of the main-line contactor. When the cam switch opens, the line contactor is deenergized and breaks the circuit to the controller. The guide is equipped with



an extra cam switch for use with locomotives having hydraulic brakes. This arrangement, in addition to breaking the electrical circuit, provides automatic application of the hydraulic brakes, bringing the locomotive to an immediate stop. The device is so arranged that it can be reset easily by the motorman.

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Dust Filters

A new development in respiratory safety by Mine Safety Appliances Co., Pittsburgh, Pa., is colored filters for M.S.A. Comfo and Dustfoe respirators. Each of the three types of filters has its own distinctive color, showing through the Dustfoe and open Comfo filter containers and permitting inspection at a glance of the filter type employed, without removal from the respirator.

Thus, states the manufacturer, the filter

. . . eliminate ventilation risks and increase production with

MOROPA

COTTON BRATTICE CLOTH

Try the "Blow-Torch Test"

This is no time to risk production losses through faulty ventilation . . . . MOROPA COTTON BRATTICE CLOTH, as proved in the mines of many leading producers, is the soundest choice for the safety that allows you to boost vital production.

A careful examination of MOROPA'S characteristics reveals the reasons for its acceptance. MOROPA is Flame-Resistant, has low Porosity, Resists Mildew, and gives Maximum Wear.

See data on MOROPA, page 123 of the 1943 Coal Mining Catalog . . . or write us! MOROPA comes in standard widths up to 84 inches.

Moropa

. . . . made in America, of American Cotton, manufactured by . . . .

Act today to eliminate unnecessary ventilation risks . . . . install MOROPA.

JOHN FLOCKER & COMPANY

642 GRANT ST. EST. 1822 PITTSBURGH, PA.

VERY Close Tolerances

• We satisfy NEMA standards in the Superior line as a whole. In some cases, however, tolerances of .0005 must be observed. Since carbon is too hard to be machined, every Superior Carbon Brush is ground to size with carborundum stone. In grinding, as in all other essential respects, Superior facilities are adequate. Write for Bulletin No. 7.

SUPERIOR CARBON PRODUCTS, INC.

9111 George Avenue Cleveland 5, Ohio

"Since 1917" **SUPERIOR** CARBON BRUSHES

For Simplified Welding,..

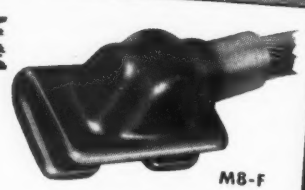
Use

MESCO Rail Bonds

★ The M8-F and M5-F Mescoweld Rail Bonds are designed to increase the welding area by about 15% and lower the resistance at the same time.

These two bonds are typical of the 18 different style bonds for every bonding requirement which are graphically illustrated in the NEW MOSEBACH CATALOG No. 44.

Write for your copy today!



M8-F

M5-F

MOSEBACH

ELECTRIC & SUPPLY CO

1115 Arlington Ave., Pittsburgh 3, Pa.

type is constantly in view for worker, foreman and safety inspector, helping to assure correct filter use for each type of job. Workers are able quickly to associate color of filter with its dust and fume protective classification. Storekeepers issue the correct filter to each worker by color—quickly, easily and without error.

Filters furnishing U. S. Bureau of Mines-approved protection against all dusts (including toxic dusts, lead, cadmium, magnesium, etc.) are light red in color. Light green indicates protection against fibrosis-producing (silica, asbestos) and pneumoconiosis-producing dusts and mists. Gray is the color of the Comfo metal-fume respirator filter.

•

Electronic Controls

The new "Eleco RPM Control" for shunt-wound d.c. motors up to 250 hp. is announced by Electron Equipment Corp., 917 Meridan St., South Pasadena, Calif. This control, says the manufacturer, gives stepless speed control to d.c. motors operating from three-phase 50/60 cycle lines.

This equipment makes use of an electronic transformer and gas diode tubes in place of grid-controlled tubes. The manufacturer says that since the grid-controlled tubes are unnecessary this eliminates the undesirable features of grid-controlled tubes, such as low power factor, waveform distortion, armature heating, complicated circuits, expert servicing and high cost.

Preset speeds with current limited acceleration, reversing, dynamic-braking, inching and plugging may be specified.

•

Truck Tire

New design and construction of the Speedliner Silvertown truck tire of the B. F. Goodrich Co., Akron, Ohio, making it run cooler than ever before, are announced by J. E. Powers, manager, truck and bus tire department. The new tire is available in 7.50-20 eight ply or larger.

Reduced tread thickness at the shoulders and addition of new ventilating grooves in the shoulder blocks are principal changes in the tire construction which lessen operating heat, while other improvements in design are said to reduce dangers of sidewall cracking. The sidewall has been made thicker at the base of the grooves between the shoulder blocks and the ornamental rib on the sidewall constructed shallower to provide better distribution of stresses.

•

Balancing Compound

Sterling Varnish Co., 182 Ohio River Boulevard, Haysville, Pa., offers R-943 balancing compound, a material designed for the balancing of electric motor armatures. It is supplied in paste or soft putty form, so application can be made easily with the hands or with a knife. The company states that it will set in air at room

THE COST OF LEAKS
SIZE OF OPENING
AIR 100 LBS. PRESSURE
CU. FT WASTED PER MONTH
COST AT 10c PER M.
STEAM 100 LBS. PRESSURE
LBS WASTED PER MONTH
COST AT 60c PER M.
WATER 40 LBS. PRESSURE
GAL. WASTED PER MONTH
COST AT 15½c PER M
3/8 9,979,200 $997.92 460,000 $276.00 692,400 $108.00
1/4 4,449,600 444.96 203,000 121.80 307,700 48.00
1/8 1,114,560 111.46 50,500 30.30 76,900 12.00
1/16 278,640 27.86 12,750 7.65 19,200 3.00
1/32 69,552 6.96 3,175 1.91 4,800 0.80
TIGHT VALVES STOP LEAKS—SAVE MONEY
USE DEXTER VALVE RESEATING MACHINES

Wire Drawing Costs Money in Coal Mine Valves

That small valve leak opening — the equivalent of a $\frac{1}{32}$-inch hole, for example — can cause big losses in steam, air or water; and in certain process lines a small leak may be really serious. Unless the leak is repaired promptly, it will grow in size until a complete overhaul or a new valve is needed.

Reseat Early, the Low-Cost Dexter Way

The only sensible way to stop "wire drawing" and leak losses is to reseat the valve, in the early stages, right on the line, with Dexter Valve Reseating Equipment. No new parts will be needed, little time will be lost, and the labor cost will be negligible.

Tell us about your leaky valves. We'll tell you the Dexter equipment needed to stop your troubles — permanently.

THE LEAVITT MACHINE COMPANY
ORANGE, MASSACHUSETTS

Don't Make the Mistake

of thinking all bearing materials are alike

PROMET
THE Engineered BRONZE

SUPERIOR SERVICE GUARANTEED

or your purchase price, including freight, will be refunded.

Specializing in Bronze Bearings and Bushings for Coal Mining Equipment.

Specific formulae designed to best serve each requirement.

Pioneers in Superior High Lead Bronzes and Alloys.

Parts for Jeffrey, Goodman, Westinghouse, General Electric, Sullivan, Joy Equipment, etc.

THE AMERICAN CRUCIBLE PRODUCTS CO.

1307 Oberlin Ave., Lorain, Ohio, U. S. A.

Prompt deliveries can usually be made from stocks maintained at

BECKLEY, W. VA., The Universal Supply Co., Corner 2nd Ave. and 2nd St...Phone 3642
LORAIN, OHIO, The American Crucible Products Co.....Phone 6983
WILLIAMSON, W. VA., Williamson Supply Co.....Phone 1200

Other Representatives

BIG STONE GAP, VIRGINIA.....C. P. Cawood
BIRMINGHAM 1, ALA., O. D. Lindstrom Equipment Co.....P. O. Box 103
CANTON, OHIO, Bowdil Company, Waynesburg Road.....Phone 29-808
MT. LEBANON, PA., J. E. Nieser, 720 Roselawn Ave. .....Phone Pittsburgh 9876
ALTON, ILL., Frank E. Rhine, 623 Blair Ave.....Phone Alton 3-8624

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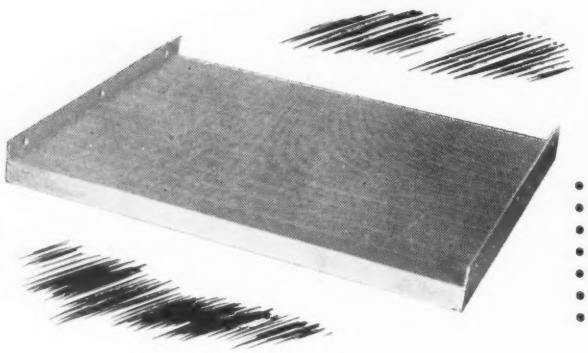
USE **"BEE • ZEE"** SCREENS



ALL TYPES SCREENS

- Chute & Conveyor
- Rigid Panel Vibrator
- Heat Dryer
- Hook-type Vibrator
- Shaker Panel
- Centrifugal Dryer
- Sizing Screen

Bixby-Zimmer round-rod screens are tailor-made in many designs for all sizing, dewatering and drying equipment. They're built for long life and efficient screening operation. Take advantage of "Bee-Zee" savings — call or write for information today.

BEE ZEE

BIXBY • ZIMMER ENGINEERING CO.

961 Abingdon St. • GALESBURG, ILL.

temperature in about two hours to a condition such that it will not be affected by subsequent application of insulating varnishes. It does not, however, attain its maximum hardness and mechanical strength unless it is subjected to a temperature of 135 deg. C.

Although this compound originally was intended for the balancing of rotating parts, it is said to be useful also for certain types of filling operations such as coil margins and small interstices where good adhesive qualities, a low coefficient of expansion and high mechanical strength are required. Normally supplied in buff color, it also may be furnished in black if desired.

•

Electrode

Air Reduction Sales Co., New York City, offers a new coated aluminum-bronze electrode—a shielded-arc unit which also can be used as filler rod in carbon arc welding. It is said to produce welding deposits of great strength and hot ductility combined with resistance to corrosion. Airco No. 100 has almost universal application in the welding of most bronzes, malleable and cast iron or steel, it is stated. It also can be used for welding dissimilar metals, such as cast iron to brass, steel to malleable iron, or in joining any two metals weldable with aluminum bronze.

Sizes from $\frac{1}{8}$ to $\frac{3}{16}$ in. in 14-in. lengths and $\frac{1}{4}$ in. in 18-in. lengths are standard stock items; sizes from $\frac{5}{16}$ to $\frac{1}{2}$ in. in 18-in. lengths may be procured on special order.

•

Engine-Driven Welder

A new "Shield-Arc" engine-driven welder rated at 200 amp. in strong, lightweight, construction with powerful inclosed rubber-mounted engine of 29 hp. is offered by the Lincoln Electric Co., Cleveland, Ohio. This new unit, supplied complete with base and canopy, has a current range of 40 to 250 amp. Dual control of welding current is accomplished by adjustment of series fields and generator speed.

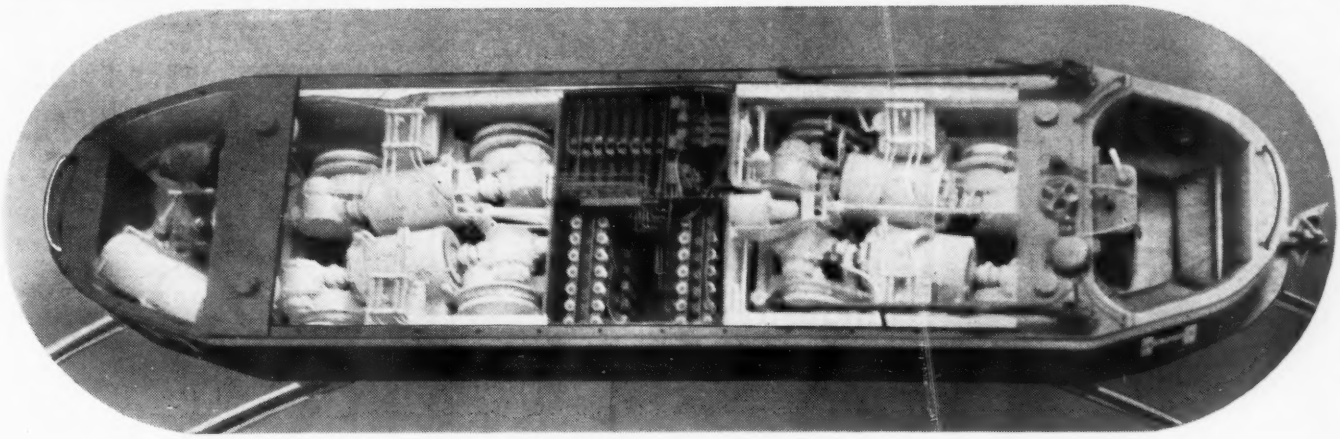
For metallic arc welding with bare or coated electrodes, the new model also supplies uniform welding current for carbon arc welding. The generator control, or job selector, is said to assure accuracy of open-circuit voltage and permit precise control of engine speed of from 1,500 to 1,150 r.p.m. for welding. In addition this control may be used to manually reduce the engine speed to as low as 750 r.p.m. whenever it is necessary to stop welding at intervals of a few minutes. Illustrated Bulletin 312-C, describing this new welding unit, is available on request.

•

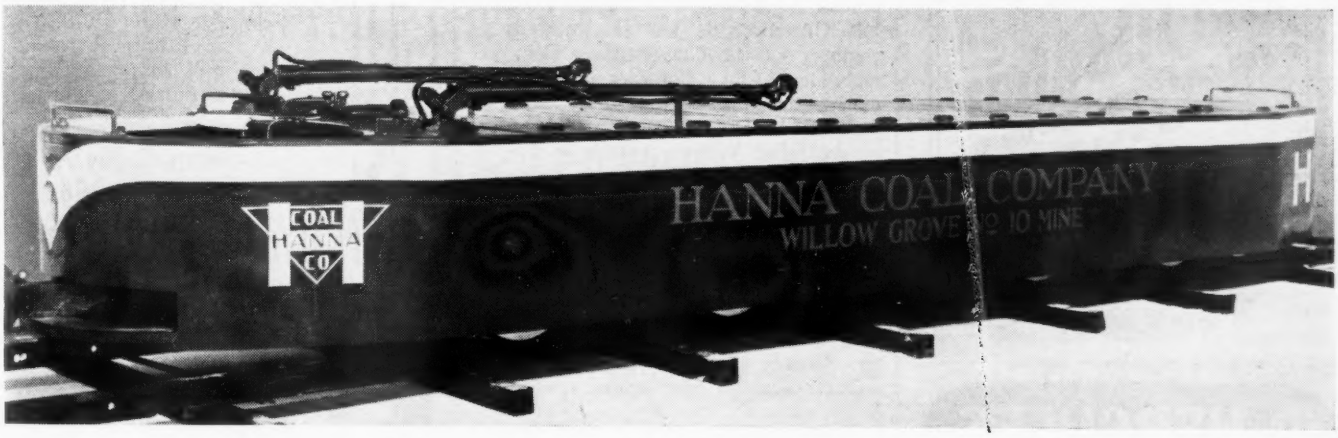
Industrial Gloves

Two types of industrial gloves made from synthetic rubber are now being manufactured by the B. F. Goodrich Co., Akron, Ohio. One is a lightweight type, 0.15-in. gage, 10½ in. length. Sizes, in halves, range from 7 to 11. The second glove is 0.30 in. gage, 14 in. long, in

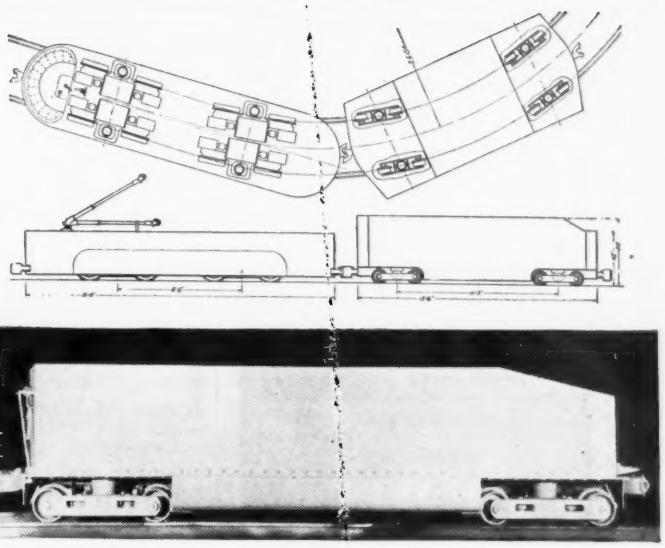
DIFFERENTIAL 8 WHEEL AXLESS LOCOMOTIVE



Plan view shows 21 ton Differential AXLESS Locomotive on a 25-foot radius curve—notice compact design and accessibility for easy maintenance



Differential 360 HP 8-Wheel AXLESS Locomotive has much more adhesion available for tractive effort and braking due to tandem drive correcting for transfer of weight. In addition there is no connection between the wheels on one rail and the wheels on the other rail. Therefore, when negotiating a curve there is no slippage due to difference in wheel travel. By eliminating this slippage, the adhesion between rail and wheel is not broken and there is no loss of drawbar pull. This modern locomotive with AXLESS trucks provides greater traction—power on all eight wheels—smooth riding—which enables it to haul heavier loads at high speeds in safety. Full anti-friction bearings and gears operate in a bath of oil sealed away from dirt.



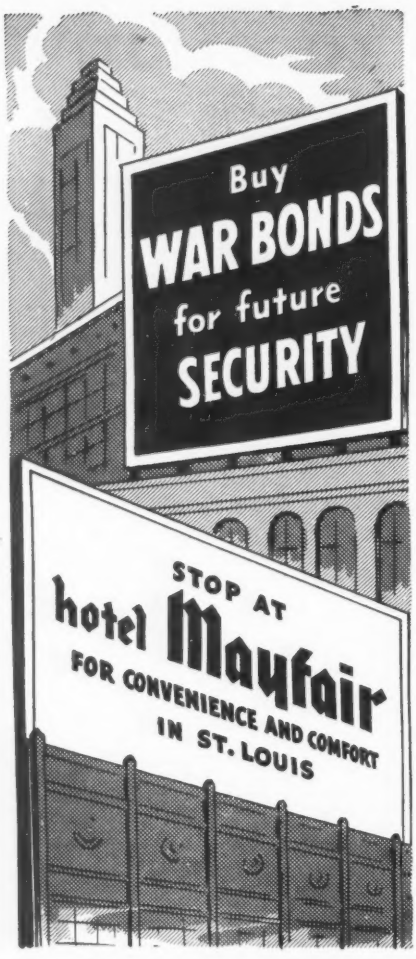
Differential 8 Wheel AXLESS Mine Cars provide greater carrying capacity within a limited height—Requires fewer cars and less maintenance. Smooth riding reduces spillage on haulage ways and assures safety at higher speeds. Less cost per ton—more tons per shift.

DIFFERENTIAL STEEL CAR COMPANY

FINDLAY, OHIO, U. S. A.

Builders of Haulage Equipment Since 1915

AIR DUMP CARS · MINE CARS · MINE LOCOMOTIVES · ROCK LARRIES · DUMPING DEVICES
BURDEN-BEARING LOCOMOTIVES · STOCKPILING CARS · COMPLETE HAULAGE SYSTEMS



HERCULES AUGERS

Hercules Augers

Ideal for modern high speed electric drills—withstands whips and torsional strains. Flint hard and tough as whalebone. Drills faster—drills more holes with resharpening—outlasts four to five ordinary drills. Recommended for the hardest jobs. Up to 3" diameters—up to 16 ft. in length.

Black Diamond Augers

Carefully made from high-carbon crucible grade steel—heat-treated to obtain as much hardness and toughness as possible, to prevent broken tangs and points. Furnished up to 2" diameters—maximum over-all lengths 16 ft.

Standard Augers

Originally developed for use with hand drills. These augers work best at hand drilling drilling holes under stumps, and ditch blasting. Up to 2" diameters from oval steel, 7/16" thick, and maximum length of ten ft.

Call on us for any type auger you may require in your operations. We specialize in manufacturing the better grade alloy, heat-treated augers. Write, wire or 'phone for details concerning sizes, prices, deliveries, etc.

SALEM TOOL COMPANY
SALEM OHIO

sizes 10, 10½ and 11. The heavier glove is available only in the straight-finger style.

According to the company, the synthetic rubber gloves are equal in most respects to those made from natural rubber, being as good in resisting acids and at the same time as grease- and oil-resistant. If synthetic rubber gloves have been packed for a long time and look wrinkled and stiff on being unpacked, it is pointed out, their normal snap and life will reappear if they are held under warm water for a few minutes.

•

Industrial Notes

PORTABLE LAMP & EQUIPMENT CO., Pittsburgh, Pa., has appointed Joseph R. Blackburn to its sales staff, with headquarters at 1714 McClung St., Charleston, W. Va. He was for three years an administrative assistant in the State Department of West Virginia. After graduation in mining engineering from Washington and Lee University he was employed as an engineer for the Consolidation Coal Co. in Somerset, Pa. For four years he was manager of the Austen Coal & Coke Co., Austen, W. Va., and five years manager of the West Virginia branch of W. H. Bradford Co., Philadelphia. Intermittently he was employed by the E. V. d'Invilliers Engineering Co., examining and appraising mining property.

VULCAN IRON WORKS, Wilkes-Barre, Pa., has appointed Howard G. Jones as New York representative at 50 Church St. Twenty years with the company, he succeeds Thomas MacLachlan, resigned.

WORTHINGTON PUMP & MACHINERY CORP., Harrison, N. J., has appointed William O. Wilson, Evanston, Ill., as a commercial vice-president. He will be responsible for general supervision and direction of all the company's commercial activities in the Chicago, St. Louis, Kansas City and St. Paul district office territories with headquarters at 400 West Madison St., Chicago. He has been with Worthington and its predecessor companies since 1898 except for a two-year period. Second and third star renewals of the Army-Navy "E" and Navy "E" production awards to two Worthington plants have been made. These constitute the 12th and 13th honors accorded the men and women and management of Worthington.

EDWARD T. MCNALLY, second vice-president and treasurer, McNally-Pittsburg Mfg. Corp., Pittsburg, Kan., has been granted leave and is now serving as ensign, U. S. Navy.

AMERICAN CAR & FOUNDRY CO., New York City, has appointed Thomas F. Wilson Jr. as assistant to the senior vice-president; E. J. Finkbeiner as assistant vice-president and J. L. Wood as assistant vice-president.

DE LAVAL STEAM TURBINE CO., Trenton, N. J., has been awarded a third Navy "E" star for meritorious service on the production front.

JOSEPH T. RYERSON & SON, INC., has purchased from the Bethlehem Steel Co.

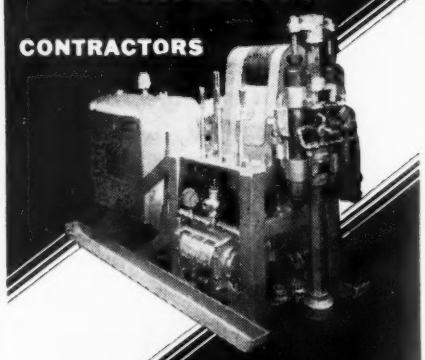
SAVE TIME
WITH
COFFING'S "SAFETY-PULL"
RATCHET LEVER HOIST

Hundreds of war plants are speeding production by equipping their maintenance and construction crews with "SAFETY-PULL" ratchet lever hoists. They can easily be carried about by one man, will operate in any position, and may be used for either pulling or lifting. A real tool for those inevitable maintenance jobs.

Write Today For Catalog GG6

COFFING HOIST CO.
DANVILLE ILLINOIS

MOTT
DIAMOND CORE DRILLING
CONTRACTORS



Mott Type "A" Oil Hydraulic 1500 Ft. Cap., 2¾" Diameter Core.

● Coal and all mineral properties tested—using our light gasoline drills. They save fuel and moving costs . . . guarantee satisfactory and proper cores.

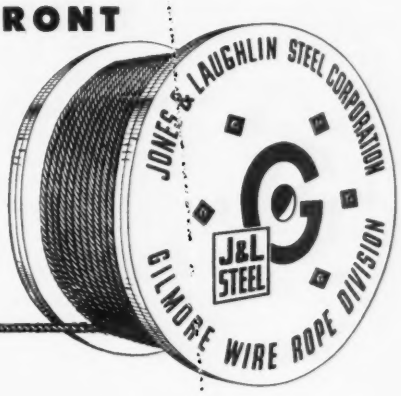
Pre-pressure grouting for mine shafts, ground solidification for wet mine areas by our stop grout method. Water wells and discharge holes drilled and grouted . . . electric drills for inside mine drilling.

MOTT CORE DRILLING CO.
HUNTINGTON • WEST VIRGINIA

WIRE ROPE IS THE LIFELINE

FROM PRODUCTION FRONT TO BATTLE-FRONT

Keep your wire rope doing its duty for the duration



Wire rope is as vital to winning this war . . . as are guns and ships and planes. For none of these fighting tools could be made or shipped or put into action so quickly without wire rope. Wire rope reaches back to the source of raw materials . . . hoists, pulls, moves them into production . . . swings the finished matériel on to ships . . . unloads it . . . puts it on the fighting line.

As a user of wire rope you can do your part by making every length of rope last and last. And this you can do by care . . . extra care . . . unceasing care. Your regular source of supply is ready to give you helpful information on how to get maximum ton-miles of service from your wire rope.

HOW TO MAKE YOUR WIRE ROPE LAST LONGER

Select the right rope for the job

1. Get the proper construction
2. Be sure the size is right
3. Specify the right lay
4. Allow ample safety factor

Install wire rope properly

1. Unreel rope correctly
2. Wind rope on drum properly
3. Do not allow rope to kink
4. Fix adequate clamps properly
5. Reeve rope through sheaves and blocks carefully
6. Seize rope-ends thoroughly

Be diligent in maintenance of wire rope

1. Inspect ropes regularly and carefully
2. Inspect sheaves and bearings often and thoroughly
3. Check rope lubricant frequently
4. Clean ropes regularly
5. Avoid impact or shock loads

JONES & LAUGHLIN STEEL CORPORATION

WIRE ROPE DIVISION

PITTSBURGH AND MUNCY, PENNSYLVANIA

J&L STEEL

its Pittsburgh steel warehouse plant at Carnegie, Pa., adjacent to Pittsburgh. Because of limited office facilities at the plant, Ryerson has opened a sales office in the Grant Building, 330 Grant St., Pittsburgh. Included in the purchase is the Bethlehem stock of bars, shapes, plates and sheets. It is the plan to augment this stock and plant facilities as soon as conditions permit. Howard L. Robinson, of the Ryerson Cleveland organization, who has served in the Pittsburgh territory for some time, will be located in the Grant Building as the Ryerson Pittsburgh representative. W. W. Kopf, of the Ryerson Philadelphia plant, will be located at the plant office in Carnegie.

ALLIS-CHALMERS MFG. CO., Milwaukee, Wis., has appointed A. D. Robertson as assistant manager of the motor division at its Norwood (Ohio) works. This plant manufacturers all but the larger sizes of A.-C. motors. He was transferred from the company's electrical department in Milwaukee, where he had been in charge of the marine section. Prior to this he served as a sales engineer in the company's Washington (D. C.) office.

AMERICAN CHAIN & CABLE CO., INC., Bridgeport, Conn., has appointed Alton Parker Hall as assistant general manager of sales, with headquarters at 230 Park Ave., New York City. He was with Bethlehem Steel Co. since 1922, having served first in the operating department, then in the sales department since 1925.

JOSHUA HENDY IRON WORKS has appointed Lyman D. Warner as sales manager, Crocker-Wheeler division, Ampere, N. J. He has been assistant sales manager since 1941 and active in the sale of motors, generators and flexible couplings for Crocker-Wheeler since 1937. He was formerly connected with Ingersoll Rand Co. and the General Electric Co.

WICKWIRE SPENCER STEEL CO., New York City, has appointed H. C. Allington as sales research engineer. He will be in charge of development and expansion of markets with particular emphasis on the oil and petroleum fields.

VULCAN IRON WORKS, Wilkes-Barre, Pa., has appointed Joseph F. O'Brien as assistant to the president, in charge of all matters relating to operation and production. Howard G. Jones has been named New York representative at 50 Church St. He succeeds Thomas MacLachlan, resigned.

COCHRANE CORP., Philadelphia, manufacturer of water-conditioning equipment, filters, blow-off systems, steam specialties and flow meters, has been given the Army-Navy "E" award for excellence in production.

LAPLANT-CHOATE MFG. CO., INC., Cedar Rapids, Iowa, has appointed as general manager H. H. Buchanan, formerly assistant general sales manager and acting export manager for the Thew Shovel Co., Lorain, Ohio. He succeeds H. N. Graves, resigned.

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Trade Literature

CALCULATING CHAIN-DRIVE CENTERS AND CHAIN LENGTHS—Link-Belt Co., Chicago. Book 1991 contains a series of tables to shorten the time required to calculate center distances and chain length of chain drives operating over cut-tooth wheels. The number of teeth in small sprocket wheel of the drive is given in the upper right-hand corner of the right-hand page of each spread of pages. The number of teeth in the large wheel appears at the top of each of the tables. The body of table gives exact center distances for a chain of 1 in. pitch and of the length listed in pitches in the first column. Center distance for any other pitch of chain may be obtained by multiplying the centers in table by the pitch.

FRAME CONSTRUCTION—Unistrut Corp., Wayne, Mich. General Bulletin 1 describes and pictures the Atwood system of frame construction using Unistrut with a saw and wrench for fitting accessories in the mining field—such as cable, conduit, busbar and pipe supports; concrete inserts; ladders and railings, bar and sheet-metal racks, storage bins, mechanics' benches, etc.

GAGE—Manning, Maxwell & Moore, Inc., Bridgeport 2, Conn. Catalog 1279, on the Ashcroft Duragauge, shows the assembly of the gage and gives full explanation in text and illustration of the rotary movement, design and construction of the system, general dimensional drawings, and illustrations of all 31 dials available.

METHANE DETECTOR—Mine Safety Appliances Co., Pittsburgh, Pa. Bulletin DU-2 describes the M.S.A. improved methane detector for quickly and accurately indicating the exact concentration of even exceedingly small quantities of methane in mine air. It is said to be light, compact, easy to operate and approved by the U. S. Bureau of Mines.

SHEAVE—Allis-Chalmers Mfg. Co., Milwaukee, Wis. Bulletin B6310 describes the "Magic-Grip" sheave, designed for fast, easy mounting. Completely assembled, with bushing, it comes ready for instant mounting by simply slipping on, sliding to the desired position and tightening three capscrews. It is said to give smooth-running performance—no wobbling action and no vibration.

SOLDERING COMPOUND — Metallizing Co. of America, Chicago. Bulletin 17 describes Mogul flux, said to be a revolutionary compound eliminating obvious disadvantages characteristic of many soldering compounds. Shop information on how to save time, money and labor, applications, directions and general information are given.

PROFESSIONAL SERVICES

Consulting **Specialists** **Plant Design**
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Examinations **Reports** **Construction**

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ENGINEERS AND BUILDERS OF MODERN COAL OPERATION
Authoritative Valuations and Reports of Mining Properties, Equipment and Operation.
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COAL PREPARATION
To Yield Maximum Net Returns
Face and Product Studies
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Consulting Engineers
Valuation, Mine Mechanization and Coal Preparation.
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Reports, Valuation, Construction, Operation, Management
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30 Years
Continuous Consulting Service to Coal Mines
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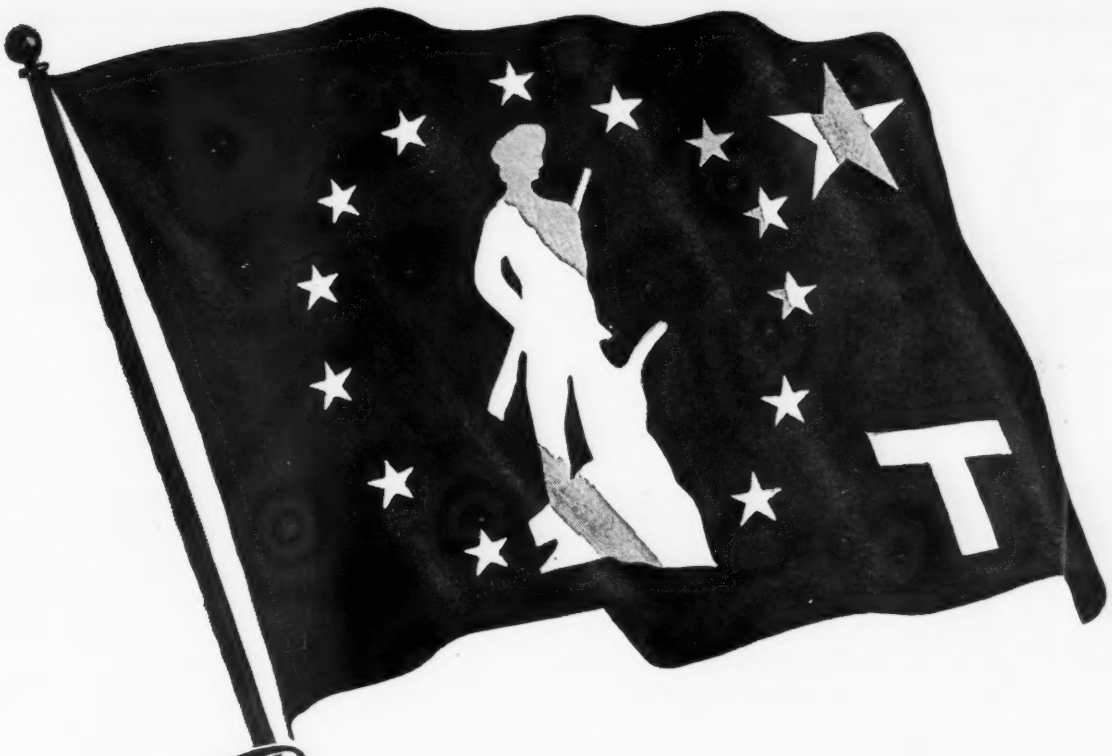
whose cards appear on this page with the confidence justified by the offering of these special services nationally.



Congratulations

ON A FINE JOB, WELL DONE!

THE Treasury "Star" Flag—the bond-buying counterpart of the Army-Navy "E"—marks plants with at least 90% of personnel participating in the Payroll Savings Plan to at least 10% of gross payroll, *and also having reached, or topped, a War Loan Drive quota!*

The successful close of the 4th War Loan Drive finds many more "Star" Flags than ever before flying over the industrial plants of America. To all these, go the heartiest thanks of the nation, and the deep appreciation of the Treasury Department for a great job! And to those who may not quite have qualified for the "Star," go equally sincere thanks—and the confidence that soon they, too, will join the ranks of the "Star" fliers.

One thought that many concerns have found helpful in stepping up the intake from their Payroll Savings Plans is this. In many cases the Treasury Representative in a plant has been able to point out the fact that during *Loan Drive periods* the employees have found it possible to spare much more than they had counted on when setting up their original subscription, and that—*when properly approached*—a very substantial fraction of such employees will decide they can well afford a distinct increase in their current Payroll Savings Plan.

Talk this over with your Treasury Representative—it offers important possibilities when correctly handled. And again accept the Treasury Department's congratulations for your fine work in helping to put over the 4th War Loan.

LET'S **ALL** KEEP
BACKING THE ATTACK
WITH **WAR BONDS**

The Treasury Department acknowledges with appreciation the publication of this message by

COAL AGE

This is an official U. S. Treasury advertisement—prepared under auspices of Treasury Department and War Advertising Council.

New Simplex Mine Roof Jacks

Cut Timbering Costs To the Bone!

Simplex Model M17 Mine Roof Jack, 16-tons capacity, 1 7/8" screw for use with extra heavy 2" pipe. Model M9, 8-tons capacity, 1 1/2" screw for use with standard 2" pipe. Both models furnished with lever nut or combination slide and drop handle, and a rugged base that is bolted through the pipe.

Further to reduce timbering costs per ton of coal mined (an economy in which Simplex Jacks have long figured), these new models have been developed; providing the added features of reduced equipment inventory and adaptability regardless of seam height. By purchasing the screw assembly and base, these jacks can be used in mines having coal seams of variable height.

Templeton, Kenly & Co.
Chicago (44), Ill.
Better, Safer Mine Jacks Since 1899

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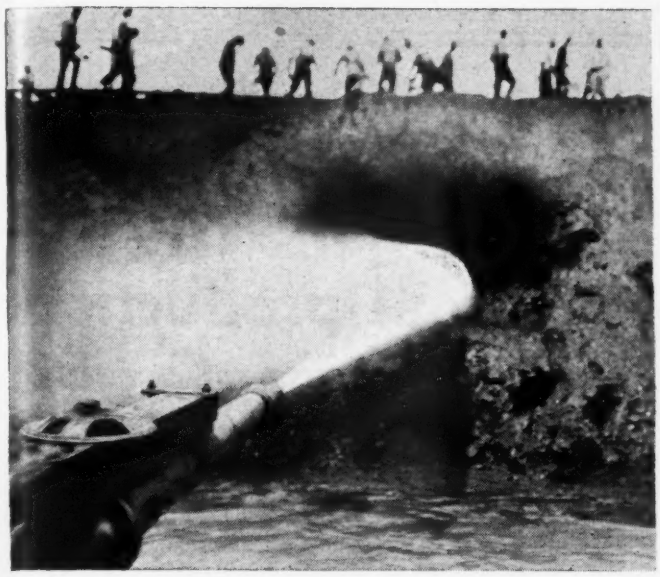

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. . . . . powered by a MORRIS Pump

This hydraulic giant is "caving down" a bank of dense, hard, clayey material through the pressure developed by a MORRIS Centrifugal Pump.

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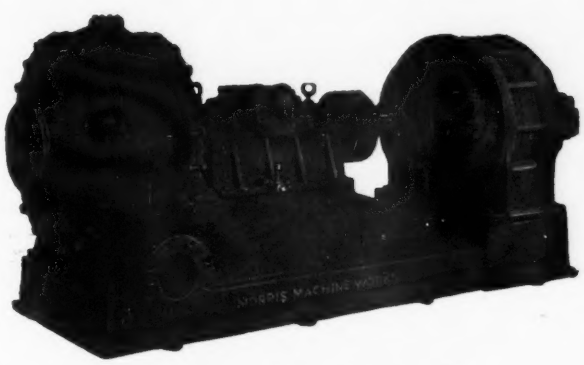

Morris Heavy Duty Material - Handling Pump

MORRIS MACHINE WORKS

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MORRIS ESTABLISHED 1864

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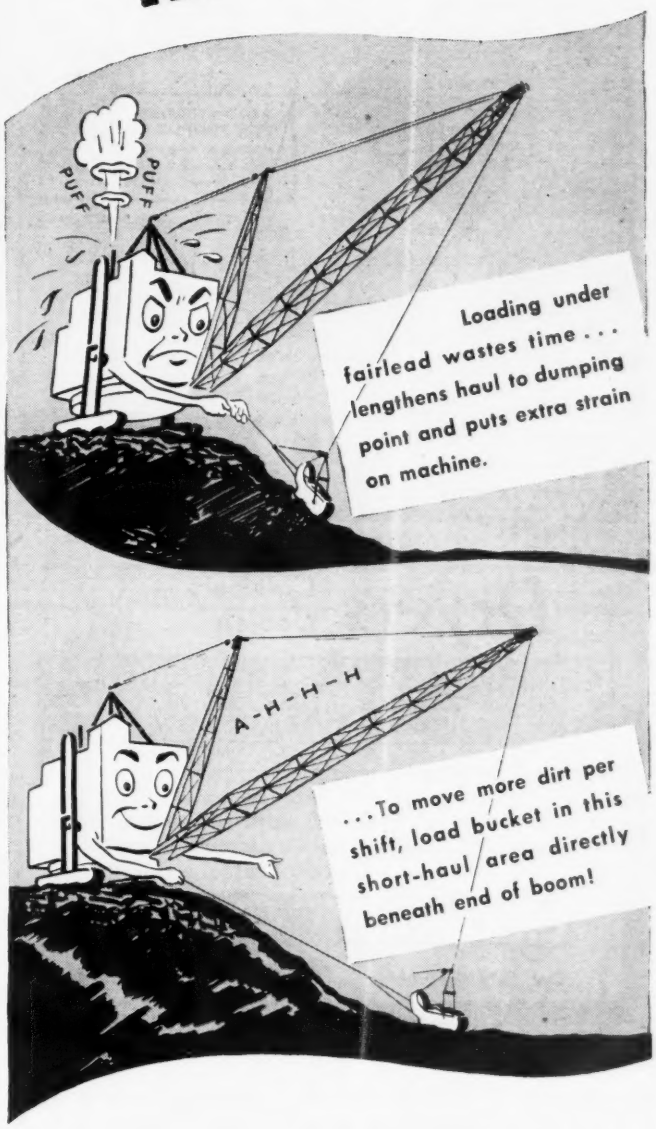
CENTRIFUGAL PUMPS

DRAGLINE PRODUCTION TIP NO. 1

DON'T LOAD THE BUCKET UNDER THE FAIRLEAD!


PUFF
PUFF
PUFF
Loading under fairlead wastes time . . . lengthens haul to dumping point and puts extra strain on machine.
A-H-H-H
. . . To move more dirt per shift, load bucket in this short-haul area directly beneath end of boom!

A Page AUTOMATIC Dragline Bucket digs and fills within 1 or 2 bucket lengths . . . no need to drag it in close to get a full load. Size for size and weight for weight, a Page AUTOMATIC will outdig any other dragline bucket made!

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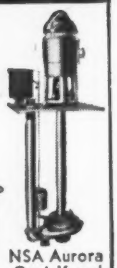
Automatic DRAGLINE BUCKETS

PAGE ENGINEERING COMPANY, CHICAGO 38, ILL.

You Can Say It With PRIDE
"IT'S AN AURORA PUMP"

Type AD Hor. Split Case, Two Stage Centrifugal

Type OD Hor. Split Case Double Suction Single Stage Centrifugal



NSA Aurora Centrifugal Sump Pump

Type GMC Close-Coupled Centrifugal

Type GGU Side Suction Single Stage Centrifugal

Aurora Pumps are the products of Experience. The Aurora Personnel has but ONE objective—the building of fine pumps. We are not jacks of all trades. We are exclusive pump builders. The splendid record of thousands of Aurora Pumps on a myriad of war services is your assurance that your post-war needs will be superbly taken care of as you, too, install "Pumps by Aurora."

Write for CONDENSED CATALOG M

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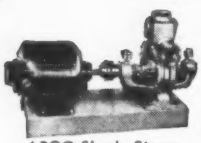
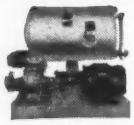


APCO Single Stage Turbine-Type



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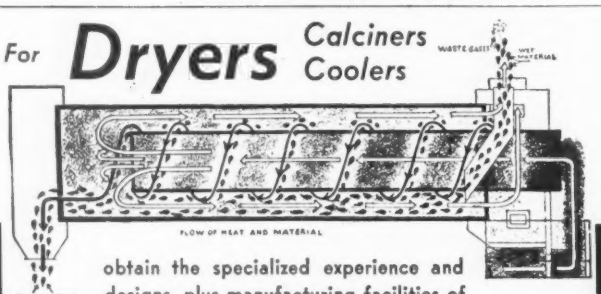

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How to get peak coal production

from your mechanical-loading equipment

Here are the most efficient methods of using various types of loading machines, conveyors, scrapers, and certain special equipment, in the loading and handling of coal underground, now presented in a readable, thorough, and practical treatment.

Mechanical Loading of Coal Underground

By Ivan A. Given

Editor-in-Charge, *Coal Age*

397 pages, 6 x 9, 222 illustrations, $4.00

THIS practical manual thoroughly discusses the various types of equipment used in slope-sinking, entry-driving and development work, and in production of coal from the usual or regular working sections—details the methods suited to or used with the various types of equipment and under various seam thicknesses and natural conditions—tells how machines are best installed, where they can fill in for other types of equipment, what to do to get biggest production from equipment.

Included in this sound book are over 200 necessary maps, plans, and sketches, showing how methods described in the text are practically applied to actual working conditions. A liberal number of mining plans tested in given mines throughout the country are here, as well as the latest thought on face preparation, power supply, and maintenance.

Tells you:

—every possible way in which equipment can be used

—how to keep equipment in first-class running order

—what factors to consider in purchasing mechanical-loading equipment

—when a small investment in simple attachments saves the purchase of an entire new machine

—installation considerations for all equipment

—methods for increasing mining extraction etc., etc.

CONTENTS

1. Mechanical - Coal - loading Principles
2. Mechanical - Coal - loading Essentials
3. Types of Mechanical-loading Units, Characteristics, Crews, Unit production—Hand-loaded Equipment
4. Types of Mechanical-loading Units, Characteristics, Crews, Unit Production — Self-loading Equipment
5. Slope-sinking and Development with Mechanical-loading Equipment
6. Conveyor-mining Plans
7. Scraper-mining Plans
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9. Face Preparation
10. Power for Mechanical Loading
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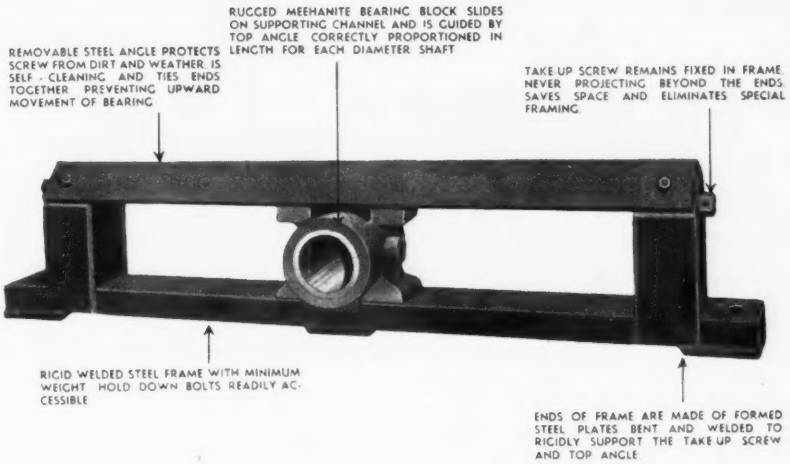
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REMOVABLE STEEL ANGLE PROTECTS SCREW FROM DIRT AND WEATHER. IS SELF - CLEANING AND TIES ENDS TOGETHER PREVENTING UPWARD MOVEMENT OF BEARING
TAKE-UP SCREW REMAINS FIXED IN FRAME. NEVER PROJECTING BEYOND THE ENDS. SAVES SPACE AND ELIMINATES SPECIAL FRAMING.
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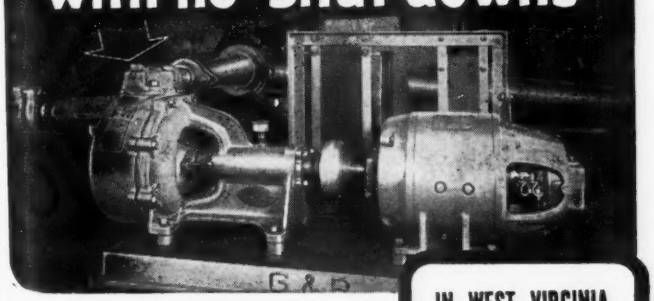
it PUMPS 24 hours a day with no "shut downs"



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Brevity is the Soul of Wit—

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Conserving Paper

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But now, when the increasing paper needs of the armed services daily decrease the national supply of paper—when paper is a true war essential—that's a different story.

All of us in business must watch every piece of paper or paper board we use. We must judge its use in terms of absolute necessity. We must not use a single piece, a single inch, of paper which thriftier writing or printing or packaging can possibly save.

For multiplied on a national scale, that particular piece or inch of paper or paper board becomes the tonnage needed by our service forces to ship precious food and ammunition and weapons and medical supplies and blood plasma to our troops overseas.

If there's no Paper Conservation Committee in your organization or in your community, why not get one going today?

This advertisement prepared under the auspices of the War Advertising Council in co-operation with the Office of War Information and the War Production Board.

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It takes 25 tons of blueprint paper to make a battleship.

700,000 different kind of items are shipped to the Army—and they're paper-wrapped or boxed.

"K" ration containers, shipped from the Eastern Seaboard alone, take 662 pounds of paper a month.

Each Signal Corps radio set takes 7 pounds of kraft paper, 3 pounds of book paper.

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USE LESS PAPER THESE WAYS

Review all printed forms periodically for essentiality; consolidation; elimination of waste space; standardization of sizes, weights, color, grade; elimination of color where possible.

Eliminate slack fills, thus effecting the economies of a smaller package.

Use 8½x5½-inch letterheads for short letters; inclose them in small envelopes.

Adjust the number of units per case to the maximum practical.

Use and re-use carbon paper consistently.

Conversely, reduce the number of units to utilize lighter carton board when such reduction will result in less tonnage over-all. Be sure that the openings are on the smallest dimension of the shipping container, so that the flaps will have the smallest area possible.

LET'S ALL USE LESS PAPER

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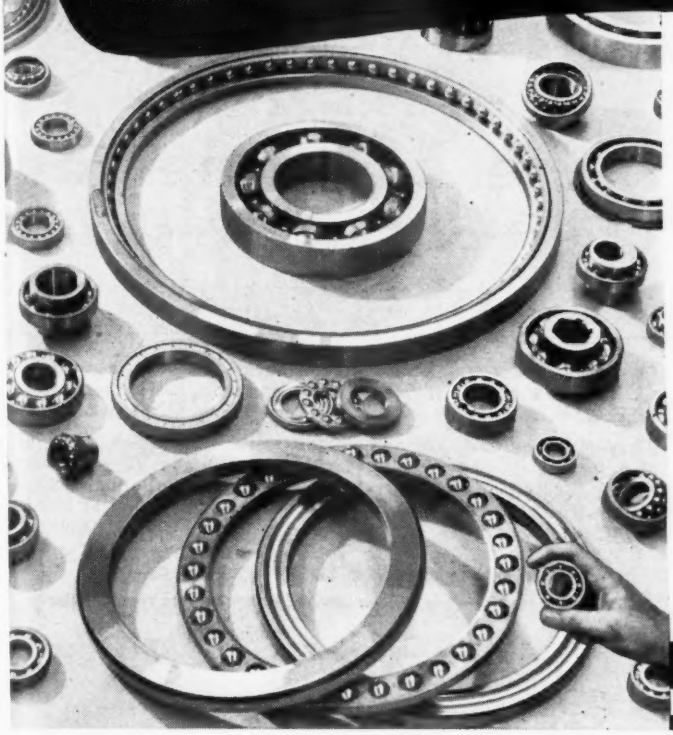

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If you want the complete story on how Ahlberg Ground Bearings are reprocessed send for *"AGB Book."*

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Faster, surer double priming Centrifugals from 1½" to 10". Compact, portable, rugged. Renewable trash-type impellers and wear plates assures longer life and extra service. Get new PUMP catalog.

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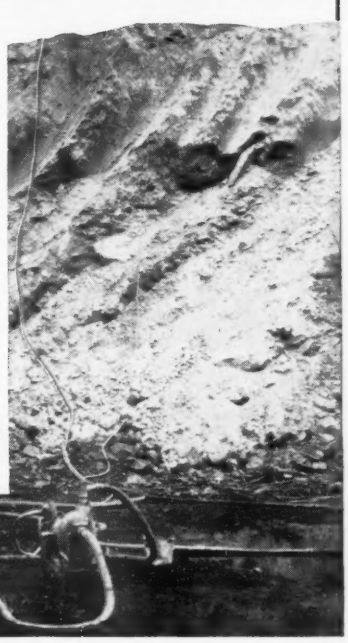

CMC Dual Prime 2" Model 7 M.E.H. in strip pit at Streamline mine. Driven by G.E. 5 H.P. 3500 R.P.M. motor

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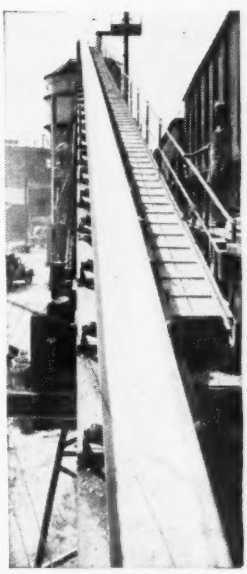
INDUSTRIAL So-Lo REPAIRS RUBBER

PROLONGS LIFE OF CONVEYOR BELTS . . . RESURFACES PULLEYS . . . PATCHES RUBBER BOOTS, GLOVES, ETC.



"ROCK PRODUCTS"

Leading industries use INDUSTRIAL So-Lo. Quickly and efficiently patches and resurfaces breaks, repairs rips, burnt, and worn spots, and fills holes in industrial belting. Increases belt life and assures "lower belt cost per mile."

Used on all belts, rubber, rubber composition, leather, textile. *Conserves war-vital materials.*

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So - Lo Works, Inc.
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THOUSANDS of men in industrial plants, mines and mills all over the country are doing just what this man is doing. They are cutting costs by repairing conveyor belts with Flexco HD Rip Plates.

WRITE TODAY FOR BULLETIN F-100 that shows how easy it is to repair rips, to strengthen soft spots and to put in patches by using Flexco HD rip plates. The bulletin also shows how to make tight butt joints in both conveyor and elevator belts with Flexco HD Belt Fasteners. These fasteners are made in six sizes. Furnished in special analysis steel for general use and in various alloys to meet special conditions.

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IF YOU want to make sure of getting your certificate of competency—sure of winning a bigger job with bigger pay, get Beard's great books today and put them to work for you.

In these three books you have a practical, always-on-the-job guide that will help you solve the problems you face every day, show you what to do, tell you why it should be done.

Beard's
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Questions and Answers!

3 volumes — $7.50, payable in four monthly payments

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Can a miner live in air in which the oxygen content is reduced to 17 per cent?

Name five duties imposed on mine foremen by law?

In what time can an engine of 40 effective hp. pump 4,000 cu. ft. of water from a shaft 360 feet deep?

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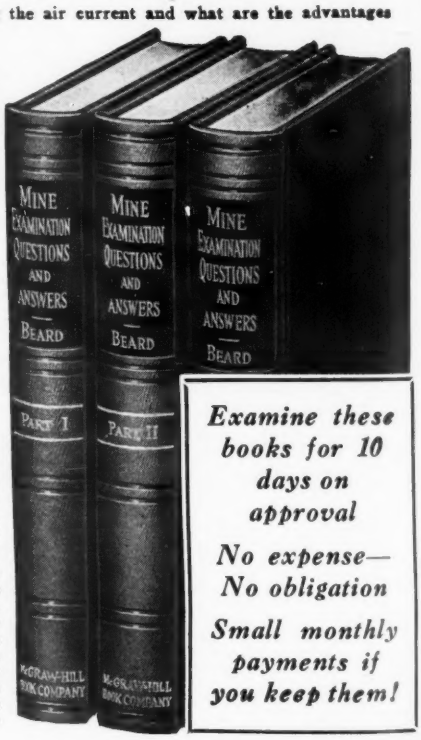

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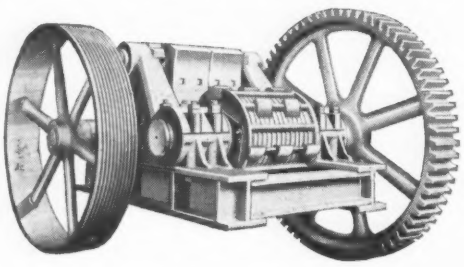
FOR FURTHER PROCESSING...



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Where rock and coal are mixed together, the heavy duty all-steel McLanahan ROCKMASTER reduces the formation for further processing and resulting coal economies.

Coal is greatly needed for war production industries . . . investigate the coal savings you can realize with McLanahan all-steel ROCKMASTER CRUSHERS.

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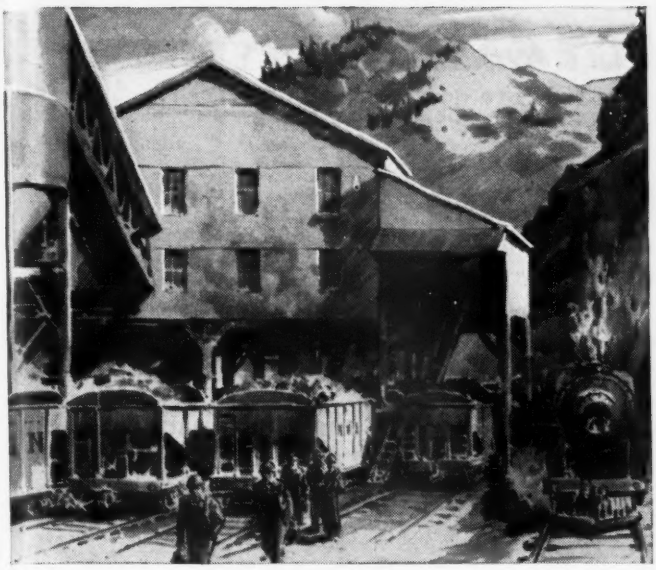

The Advantages of Dowflake for Treating Coal

★ Makes coal dustless
★ Easy to apply
★ Prevents freezing
★ Improves consumer acceptance

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Cleveland • Detroit • Chicago • St. Louis • Houston
San Francisco • Los Angeles • Seattle

DOWFLAKE CALCIUM CHLORIDE 77-80%

LONG LIFE? *Positively!*
ECONOMICAL? *Certainly!*
FIT YOUR EQUIPMENT? *Absolutely!*

Alloy Cast Iron GRID RESISTORS

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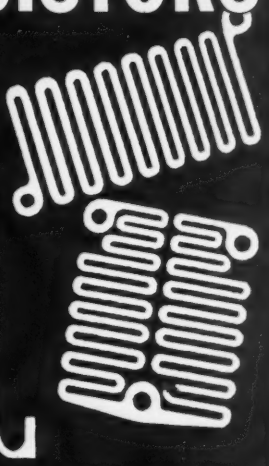

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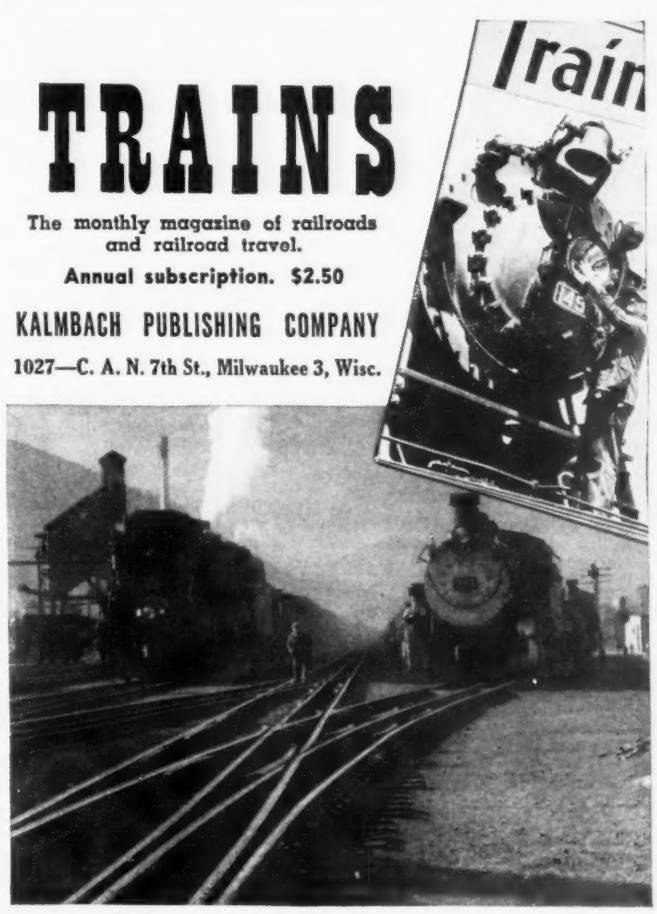

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Round—Square—Diagonal—Slot
Any perforation

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of heavy mining machinery for coal mine purposes.
Permanent men wanted who will stay with company in postwar period.
Located in small town within short distance to large cities.

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ENGINEER - SUPERINTENDENT available reasonable notice. Thirty years bituminous coal mining and construction. Conveyors, belts, efficiency and new plant construction. PW-252, Coal Age, 520 N. Michigan Ave., Chicago 11, Ill.

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FOR SALE: One 75 H.P. Type Y, 300 R.P.M., Fairbanks Morse Oil Engine. The United Dairy Co., Lodi, Ohio. 'phone 4721.

WANTED

ANYTHING within reason that is wanted in the field served by Coal Age can be quickly located through bringing it to the attention of thousands of men whose interest is assured because this is the business paper they read.

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Deep Mine Projects

Offered subject prior disposition

2239 Acres KITTANNING COAL (mineral rights)

198 Acres COAL & HEAVY TIMBER LAND (in fee)

Offered at fraction of estimated value.

500 Acres SEWELL COAL (mining rights)
For lease on small royalty basis.

125 Acres PITTSBURGH COAL. 6 ft. Seam
Mine now in operation. PRICE $62,500.00

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By using Diamond Core Drills. We drill for Limestone, Gypsum, Talc, Fire Clay, Coal and all other minerals.

PENNSYLVANIA DRILLING CO.
Drilling Contractors
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For complete mines that are going out of business or from receivers in bankruptcy, administrators of estates, etc.

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FOR SALE

ELECTRIC HOISTS

1—1300 H.P. Double Drum, cylindro-conical drum, 900' of 1¼" rope, 2300 volt.
1—1300 H.P. Shaft Hoist with cylindro-conical drum, 1675' of 1¾" rope, 2300 volt.
1—800 H.P. Allis-Chalmers, single drum, Slope Hoist, 7000' of 1¼" rope, 3000# rope pull, rope speed 870 FPM, 2300 volt.
1—500 H.P. double drum, 1600' of 1¼" rope, 2300 volt. Ward-Leonard Control.

LOCOMOTIVES

2—15-ton Goodman
1—15-ton Jeffrey
1—13-ton Goodman
2—10-ton Goodman
2— 8-ton G. E.
3— 8-ton Jeffrey
5— 6-ton G. E.
3— 6-ton Goodman

SHORTWALL MACHINES

15—Goodman, 50 H.P., 250 volt DC, 12-AA.

MISCELLANEOUS

Several Goodman G-12½ Shaker Conveyors.
200 and 300 KW Motor Generator Sets.
3, 4 and 5-track steel tipples.

Mail Us Your Inquiries!

COAL MINE EQUIPMENT SALES COMPANY

306-7 BEASLEY BUILDING L. D. Phone—34 Terre Haute, Indiana

FOR SALE

Bucyrus Erie 50B Steam Stripping Shovel with 100' brand new crane boom, boiler pressure 150#. Reconditioned. Capacity 2 yards.

P & H Model 600 Crane
Buc. Erie Steam Dragline, 6-8 yds. 175' bm.
Buc. Erie Steam Crane, Model 30B, 40' bm.
Moore Speedcrane 15 tons, gas, 63' boom
Northwest Model 104 Shovel & Crane
Michigan Crane, Shovel & Backhoe
Speeder ½ yd. Crane and Backhoe
General ½ yd. Diesel Crane
Bay City ½ yd. Shovel
Lorain 75B Gas Shovel, 1½ yds.
Marion Model 32 Steam Shovel, 1½ yds.
Ind. Brownhoist Crane, gas, 40' boom 1 yd.
Brownhoist Loco. Crane 35 tons, steam
2—Mack Trucks 6BX, Boulder Type, 12 yds.
3—Sterling Trucks, 170-C, Boulder Type, 12 yds.
Allis Chalmers "L" Tractor with bulldozer
Caterpillar D6 Tractor with bulldozer
Cletrac FD Tractor with bulldozer. Rebuilt.
Cletrac FD Tractor with Heil 12 yd. Scraper & Bulldozer
Cletrac FD Tractor with 12 yd. Heil Scraper
Scraper-Wagon, Heil 12 yard
TD9 Tractor with bulldozer
Allis Chalmers "30" Tractor with bulldozer
American 75 ton Locomotive, steam. Rebuilt
American 50 ton Saddle Tank Switcher
American 45 ton Saddle Tank Switcher
Whitcomb 14 ton, 36" gauge Diesel Loco.
Davenport 10 ton, std. gauge, gas Loco.
Vulcan 8 ton, std. gauge, gas Loco.
Vulcan 6 ton, 36" gauge, gas Locomotive
Steel Storage Bin 200 tons, ⅜" plating
I. R. 1302 CFM., 2 stage Air Compressor
I. R. 1050 CFM., 2 stage Compressor, gas drive
Bucket elevator, continuous belt type, 22" buckets, 4 x 18 Revolving Screen
Hayward 1 yd. Clam, rehandling Bucket
Haiss ¾ yd. Clam, rehandling Bucket
Erie ¾ yd. Clam, rehandling Bucket
Blaw-Knox ⅞ yd. Clam. digging Bucket
Hayward ⅞ yd. Clam. digging Bucket

RICHARD P. WALSH CO.

30 Church St. New York 7, N. Y.

LOCOMOTIVES—SALE or RENT

1—American 41 ton, 4 wheel, saddle tank, Locomotive, electric lights, steam brakes, ASME boiler, 190 lbs.
1—Lima 80 ton, 6 wheel, Switcher with tender, National Board boiler, 200 lbs. working pressure, superheater, automatic lubrication; excellent condition, immediate delivery.

OVERHEAD CRANE

1—Shepard 7½ ton, 36 ft. span, 220 volt, D.C., bucket operating.

PUMPS

2—Ingersoll Rand type 4GT, two stage, Centrifugal, capacity 1050 GPM at 1000 ft. head, 350 H.P., 2200 volt, motors, 3 phase, 60 cycle, 3500 RPM, with control equipment; 95% new.

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STEEL TANKS—STEEL BUILDINGS

All sizes and kinds
Guaranteed used steel pipe
Valves and fittings
All items at various points

JOS. GREENSPON'S SON PIPE CORP.
Nat. Stock Yds., St. Clair Co., Ill.

WANTED

USED STEEL TIPPLE

Complete with Motor, Crusher and sizing screens to prepare dry, 700 tons or more per day. State full details and price.

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IDLE MINE AVAILABLE

Rail—River—Truck outlets in Western Kentucky, Muhlenberg County, thirty miles south of Owensboro on L&NRR and State Highway #75 adjacent Green River eighty miles from its mouth at Ohio River near Evansville, Ind. In Green River seam with average thickness of six feet and one hundred feet of cover. Modern mechanization affords low cost production. Production stopped late in 1933 because NRA increased wages. Still available are surface facilities consisting of preparation plant, railroad tracks, track scale, headframe, skips, shop, store, office, fan, power lines etc. Hoisting and air shafts intact, underground equipment sold years ago. Large acreage virgin coal, proven by test holes, within hundred feet of hoisting shaft on south. Production can be resumed in 60 to 90 days. Boats and barges available. Owner in poor health. Lease or sale on easy terms.

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1—Ottumwa double drum, single gear reduction Electric Shaft Hoist, complete, in first-class condition, with 60 horsepower, 600 revolution, 220 volt, 3 phase, 60 cycle, General Electric motor.

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Clarksville, Arkansas

Prompt Shipment From Our Warehouse

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36 B Jeffrey 250 v. Low Vein #14318
112 G3 Goodman AC Universal 220/3/60
12 G3 Goodman Std. 220/3/60 AC
12 AB Goodman Std. 250 v. DC
CE 7 Sullivan 250 v. DC

STORAGE BATTERY LOCOMOTIVES

3—6 Ton G.E. Permissible Locomotives 36/44" Ga. O.S. armorplate frame, inside steel tired wheels, 2-HM 825 Ball Bearing Motors, Type LSBE Class 2C6 From C9. 13½' long, 50" high, 69" wide and 44" Wheel base. Two of the above units equipped with Edison Battery 80 cell A-10—one new in 1940, the other in 1939. The third locomotive has no battery.

7 Ton Mancha armor tank 42" Ga. with 46 cell 31x plate Philco Battery new in 1942. Low Type.
3—5 to 5½ Ton Type D Ironton, 36 or 42" Ga. Low Type.
1—4 Ton Jeffrey 42 or 44" Ga. with 2 MH 108 Ball Bearing Motors, Battery Box on top of locomotive.
1—5 Ton Atlas 40" or 44" Ga. with 2 Ball Bearing Motors. Battery box on top of locomotive.
1—5½ Ton Jeffrey 36" Ga. with 49 cell 23 plate New Exide Ironclad Battery

(Haulage)

10 Ton Jeffrey with 13 Ton Equipment O. S. armorplate frame, inside new steel tires, 2 MH 110 Ball Bearing Motors, 36/42" Ga. completely rebuilt.
13 Ton Westgh. 250 V. 36" or 40" Ga.
1—5 Ton West. 250 V. 36 or 42" Ga. /with Electric Gathering Reels. Bar steel frame.

SCREENS

2—4' x 5' single deck Tyler Hummer Screens Type 37 equipped with V-16 Vibrators No. 2860 and 2867 designed for 110 v. AC 15 cy.

MG SETS 3 ph. 60 cy. (Syn.)

150 KW Ridgway 250 V. DC 2200 V. AC 900 RPM.
100 KW Ridgway 250 V. DC—2200 V. AC 1200 RPM.
75 KW 250 v. G.E. Type DLC G.E. cpd. wd. interpole Gen. dir. con. to G.E. 100 HP Induction Motor 220 or 440 v. 3 ph. 60 cy. 1160 RPM with Starter and DC Panel.
15 KW 125 v. cpd. wd. Type S Westinghouse direct connected to 23 HP Westinghouse 220 or 440 v. 3 ph. 60 cy. Ind. Motor with starter and DC Panel.

AIR COMPRESSORS

492 cu. ft. 100#C hg. Pneumatic straight line heavy duty Diesel oil driven Compressor unit.

ENGINE GENERATOR SETS

100 KW 250 V. DC Westgh—Skinner Engine.
50 KW West. 125 V. DC—Skinner Engine.
25 KW Westinghouse 125 V. Steam Turbine.

SLIP RING & SQ. CG. MOTORS
(3 ph. 60 cy.)

HP	Make	Speed	Wdg.	Type
200	G.E.	250	S.R.	MT 412
200	G.E.	600	S.R.	I-M
150	G.E.	600	S.R.	IM
125	Al. Ch.	435	S.R.	
100	G.E.	500	S.R.	MI-25 cy.
100	Al. Ch.	575	S.R.	
100	West.	900	S.R.	CW
100	G.E.	1200	S.C.	

5 TRACK STEEL TIPPLE

Consisting of large shaker screen, 5 car retarders, 20 inch, 36 inch and 48 inch belt conveyors, crusher, 3 bins for domestic coal, 6 transformers, large number of 220 volt, 3 phase, 60 cycle motors, with gear reducers. Also air cleaning plant, including large blower with 200 HP Syn. motor. Entire tipple in place exactly as when last operated.

PUMPS

250 GPM 250# or 575' Head 2 cyl. Hor. National Transit 6" suc. 4" dis. enclosed driven by 40 HP Motor.

HOISTS

1500 HP Shaft hoist including flywheel MG set operated on 2200 volt 3 phase 60 cycle
75 HP Lidgerwood sgl. fr. drum
50 HP Diamond 2 drums same Shaft
52 HP American 2 drum, AC Motor
30 HP Clyde sgl. drum AC Motor
30 HP Double drum—Tandem
15 HP Lidgerwood sgl. dr. AC Motor

400 TRANSFORMERS
(Westgh. & GE 1 ph.)

Qu.	KVA	Pri. V.	Sec. V.
40	5	2080/2200	115/230
31	7½	"	"
28	10	"	"
2	25	2200	244/488
3	37 Rotary	4406/185	115/230
3	37½	2200	220/440
3	50	22000	2200
3	75	2200	110/220
3	75	2200	220/440
3	100	2200	220/440

AC AIR BREAKERS (unused)

8—200/400 amp. 3 pole ITE 220 v.
2—300/600 amp. 3 pole ITE 220 v.

ROTARY CONVERTERS

100 KW G.E. 275 v. 1200 RPM Type TCC with 3—37½ KVA 2300/4000 v. Transformers and switchboard.
150 KW West. 275 v. 1200 RPM with 3—50 KVA 2300/4000 v. Transformers and switchboards.

COAL CRUSHERS

24" x 30" Penna. single roll Heavy duty coal crusher.
18" x 24" Double roll New.
18" x 30" Double roll New.

SYNCHRONOUS MOTORS

HP	Make	Voltage	Speed	Type
220	G.E.	2200	600	ATI
200	West.	2200	900	
150	G.E.	2200	900	ATI

Each of the above has a dir. con. exciter.

MOORHEAD-REITMEYER CO., INC.

PITTSBURGH, PENNSYLVANIA

CARS FOR SALE

Need cars for Coal, Coke, Ballast, Etc.?

The following list has 735 such cars!

150—Hopper, Double, 50-Ton
40—Hopper, Side-Discharge, 50-Ton
10—Koppel, Side-Discharge, 24-Yd., 30-Ton
100—Refrigerator, 40-Ft., 40-Ton
16—Refrigerator, 36-Ft., 30-Ton
25—Ballast, Composite, 50-Ton
150—Box, 36-Ft., 40-Ton; Steel Ends
1—Dump, Magor, Automatic, 25-Yd., 50-Ton
1—Dump, Western, Automatic 27-Yd., 50-Ton
2—Dump, Western, Automatic, 20-Yd., 40-Ton
10—Dump, K&J, Automatic, 16-Yd., 30-Ton.
25—Flat, 40-Ft., 40-Ton
55—Gondola, Composite, 36-Ft. & 40-Ft., 40-Ton
150—Tank, 8000-Gallon, 40-Ton and 50-Ton

Perhaps this list also has some *other cars* you could use to very beneficial advantage *now?*

All cars are priced to sell!

IRON AND STEEL PRODUCTS, INC.

39 years' experience

13484 S. Brainard Ave. **Chicago 33, Illinois**

"ANYTHING containing IRON or STEEL"

CURRENT SPECIALS

Two—150 H.P. Brownell boilers. Fire tube 6 x 20 approved for 110 lbs., subject inspection and prior sale $750.00 each.

One—Sullivan C67 mining machine, 3-60-220 volt, tip turn truck, cable, etc.—Subject inspection and prior sale, $1050.00.

One—100 KW Allis-Chalmers rotary converter, with three 40 KVA transformers, HV 6900 LV 185-92.5. As is, subject inspection and prior sale, $1350.00.

Two—562 KW Allis-Chalmers turbo-generators, 3 phase 60 cycle 2300 volt, complete with condensers, piping, valves, wiring and switchboards. Price $10,000.00 per unit, subject inspection and prior sale.

HAIR EQUIPMENT COMPANY

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RAILS—CARS

All sections of rails and good serviceable second hand cars, all gauges, also spikes, bolts, frogs, switches and ties.

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RAILS and ACCESSORIES

RELAYING RAILS—Super-quality machine-reconditioned—not ordinary Relayers.
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A DEPENDABLE SOURCE for HEAVY EQUIPMENT

CARS — CRANES — COMPRESSORS
DRAGLINES — LOCOMOTIVES
SHOVELS—TRACTORS—ETC.

WE WELCOME YOUR INQUIRIES

WE WILL FIGURE WITH YOU ON YOUR SURPLUS

B. M. WEISS CO.

Girard Trust Bldg. **Phila, Pa.**

LOCOMOTIVES

Goodman: All 250 volts.
1—10 ton, 31-1-4-T.
1— 6 ton, 30B, 48" 1—5 ton.
1— 5 ton, W-1-2, 36".
1— 5 ton, 10-30.
2— 4 ton, 2600 K.
1— 6 ton, 32-1-4-T.
2— 8 ton, 32-1-4-T.

Westinghouse: All 250 volt.
1—4 ton, 902, 48" 1—13 ton, 102, 42"
1—904 c. 44" 500 volt. Also 906 motors.
1—10 ton, 915.

G.E.: All 250 volt. 4 ton 1022, 44", as is
6 ton 803, 44", as is 5 ton 825, 44"
6 ton 823, 44" 8 ton 839 motors
6 ton 801
8 ton 839

Jeffrey: 6 ton, and 4 ton, all gauges, 250 volt
1—**Jeffrey** MH 110 Locomotives
1—**Jeffrey** MH 100

MINING MACHINES

Jeffrey, 35B, 29B, and 4—28A, 250 V.
Goodman, 12A, 12AB, 12AA, 12G3A, 34B.
1—12G3 250 volt and 2—112 DA, 500 volt.
2—Permissible Type 12CA. 6—112AA,
3—124AA.
Sullivan, CE7, CE9, CE10, CR10 Low Vein.

SUBSTATIONS—275 volts, D. C.

2—200 KW **G.E. Rotaries** (600 volt)
1—200 KW **Ridgway** M.G. Set.
1—200 KW **G.E.** Rotary Converter.
1—200 KW **West.** Rotary.
1—150 KW **West.** Rotary.
1—200 KW 1—100 K **Ridgway** M-G Sets.
1—150 KW **Ridgway** Rotary.
1—150 KW **West.** Rotary-converter.
1—100 KW **West.** M-G Sets.
1— 90 KW **G.E.** Rotary.

SPARE ARMATURES

Jeffrey MH 110, MH 78, MH 73, MH 88, 29B, 35B and 28A. Goodman 34B, 30B, 30C, 12A, 12AB, 12AA 33-1-4-T, 31-1-4-T. **General Electric** 801, 803, 819, 821, 825, 839. **Westinghouse** 904, 906, 102, 907, YR2, 115. Also 200 KW **Westinghouse Rotary Converter Armature,** 250 V. Bracket Type, 150 KW G. E. HCC Bracket Type, and 150 KW G. E. TC Pedestal Type.

AERIAL TRAMWAYS * HOISTS * PUMPS * MOTORS * TRANSFORMERS * BOND WELDERS * RESISTANCE * COMPRESSORS * DUMPS * SPEED REDUCERS FIELD FRAMES * ARMATURES * GOODMAN HYDRAULIC SHOVELS * MOTOR STARTERS AND CONTROLLERS—AC & DC * DROP BAR SUPPORTS (Gooseneck), 29B and 29C * MINING MACHINE TRUCKS * SWITCHBOARDS * CIRCUIT BREAKERS—AC & DC * CONVEYOR HOISTS * COAL CRUSHERS (double roll) 12"x16", single roll 24"x36", 36"x36" CONVEYOR HOISTS, 24"x24" and 18"x16" * TURBO-GENERATOR 500 K.W. 275 volt DC * ROPE & BUTTON CONVEYOR 400' long LATHES, SHAPERS * SWITCHES * AUTOMATIC CIRCUIT BREAKERS 250 volt 600 amps to 2000 amps * MANUAL CIRCUIT BREAKERS 600 amps to 3000 amps * HOISTS, overhead, AC, 3-60-440, 1 ton and 2 ton * CAR RETARDERS, Fairmont * 1 Clam shell bucket 1¾ cubic yard, 1—Figure 8 drum * MINE CARS 22" high, 44" gauge * 2 SULLIVAN BIT SHARPENERS * R.R. SWITCHES 85# to 100# HOISTS 5 HP AC and DC. GENERATORS DC 250-275 volt, 30 KW to 100 KW. Also 50 KW 125 volt direct connected to steam engine. Goodman Scraper Loader.

GUYAN MACHINERY COMPANY, Logan, W. Va.

ROTARY CONVERTERS

500 KW G.E. SYN. 275 V. 6 Ph., 60 Cy., 1200 RPM, Pedestal Type, 2300/4000 V. Transformers.
500 KW AL-CH SYN. 275 V. 60 Ph., 60 Cy., 1200 RPM, Pedestal Type, 2300/4000 V. Transformers.
500 KW WEST. SYN. 275 V. 6 Ph., 60 Cy., 1200 RPM, Pedestal Type, 2300/4000 V. Transformers.
350 KW G.E. SYN. 575 V. HCC, 6 Ph., 60 Cy., 1200 RPM, form P, 2300/4000 V. Transformers.
200 KW G.E. SYN. 275 V. 6 Ph., 60 Cy., 1200 RPM, Bracket Type, 2300/4000 V. Transformers.
150 KW G.E. SYN. 275 V. HCC, 6 Ph., 60 Cy., 1200 RPM, form P, 2300/4000 V. Transformers.

MOTOR GENERATORS

200 KW G.E. SYN., 275 V., 2300/4000 V., 3 Ph., 60 Cy., 1200 RPM., Manual Switchgear.
200 KW G.E. IND., 600 V., 2300/4000 V., 3 Ph., 60 Cy., 1200 RPM, Manual Switchgear.
200 KW R.W. SYN., 275 V., 2300/4000 V., 3 Ph., 60 Cy., 900 RPM, 80% P.F. Manual Switchgear.

LOCOMOTIVES

13-T WESTGHE., 250 V., 908-C Mts., 36"-44" Ga.
10-T WESTGHE, 250 V., 907-C Mts., 36"-44" Ga.
10-T WESTGHE, 500 V., 907-C Mts., 36"-44" Ga.
8-T WESTGHE, 250 V., 906-C Mts., 36"-44" Ga.
8-T WESTGHE, 500 V., 906-C Mts., 36"-44" Ga.
8-T GOODMAN, 250 V., 132-A Mts., 36"-36" Ga.
8-T GEN. ELEC. 250 V., 839-L Mts., 36"-48" Ga.
6-T WESTGHE, 250 V., 904-C Mts., 36"-48" Ga.
5-T ATLAS, 250 V., 823-A Mts., 36"-42" Ga.
4-T WESTGHE, 250 V., 902-C Mts., 36"-36" Ga.

Each unit listed above is owned by us and is available now for immediate purchase.

WALLACE E. KIRK COMPANY

Incorporated

501 Grant Building Pittsburgh, Pa.

MINING MACHINES

AC & DC

REBUILT & GUARANTEED FOR IMMEDIATE SHIPMENT

Joy 12-BU Loader, 220 V., 3 Ph., 60 Cy. Rebuilt

Equipment of all kinds

Buy, Sell or Exchange

THE INDUSTRIAL EQUIPMENT CORP.

Warehouse: Carnegie, Pa.

P. O. Box 1647 Pittsburgh, Pa.

CEMENT MILL EQUIPMENT

AIR COMPRESSORS **CRUSHERS** **HOISTS** **MILLS**
BOILER PLANT **DRYERS** **KILNS** **STEEL BALLS**

Complete Stock Room Supplies, New Gears, Bearings, Belting, Safety Switches, Pumps, Shafting and Pulleys. New Spare Parts.

• BUCKET ELEVATORS

Thousands of feet of bucket elevators, all sizes of buckets, mostly all steel encased.

STEEL SCREW CONVEYORS

12" - 14" - 16" - 18" and 20" widths in Steel Box—Over 10,000 ft. all lengths.

ALLIS-CHALMERS COMPEB MILL

1—#8745 Allis Chalmers Dry Grinding Compeb Mill, 45' long. This is a four compartment mill with the first compartment 10' long and 8' in diameter. The other compartments taper to 7'. The mill has chilled iron liners, and 36" table feeder, 72" Cutler Hammer Magnetic Clutch, and 3 compartment Dust Collector.

MILLS

12—30" Griffen Mills.
1—5'6"x22 Smidth tube mill.
11—42" Fuller Lehigh pulverizers, each with belt idler.

CRUSHERS

1—Allis Chalmers Fairmont Roll Crusher, 36"x60".
1—No. 6 McCully gyratory rock crusher, style K.
1—Mosser rotary clinker crusher.

KILNS

2—Vulcan Iron Works steel rotary kilns, 8'6" x 7'6" dia., 125' long, fire brick lined.
3—W. F. Mosser & Son steel rotary kilns, 5'6" x 5' dia., 60' long, fire brick lined.

DRYERS

3—W. F. Mosser & Son steel rotary dryers, 72"x60" dia., 47', 55' and 60' long, bevel gear drive, each with counter shaft.
1—Ruggles 5' x 30' Rotary Dryer.

SPEED REDUCERS

G. & F. Speed reducer, Worm Gear type, ratio 10.20 to 1.
De Laval Worm Gear Reduction Unit 12¾ HP Ratio 13 2/3 to 1.

CENTRIFUGAL PUMPS

2 Lecourtenay 5" all bronze centrifugal pumps 500 GPM at 90' head direct connected to Allis Chalmers 20 HP Motor 440, 60, 3, 1740 RPM.
2 Lecourtenay 12" Iron Casing Motor Driven Centrifugal Pumps, type 12BT8, 5,000 GPM at 148' H., Direct connected to G.E. 250 HP Motor, type 1, E15 form K, 440, 60, 3, 1760 RPM.
Lecourtenay 12" Iron Casing Motor Driven Centrifugal Pump, 4,500 GPM at 135' H. 1750 RPM Direct Connected to Allis Chalmers 200 HP Motor, 440, 60, 3, 1750 RPM.

TURBO-CENTRIFUGAL PUMP

Terry Steam driven Turbine centrifugal pump, type GF, turbine 710 HP, 145# steam pressure, 60# backpressure, 3581 RPM direct connected to Gear Unit 1000 RPM; type U Allis Chalmers Centrifugal Pump 18" x 18", 13,000 GPM at 170' head, 1000 RPM. Pump or turbine may be bought separately.

MOTORS

440 volt—3 phase—60 cycle

1—250 HP G.E., Type 1, Form K, 1760 RPM
1—200 HP Allis Chalmers, 1750 RPM
2—25 HP Allis Chalmers, 860 RPM
2—20 HP Allis Chalmers, 1740 RPM
1—15 HP Gen. Elec., Type KT, 900 RPM
1—15 HP Gen. Elec., Type KT, 900 RPM
2—10 HP Gen. Elec., 1200 RPM
1—10 HP Gen. Elec., Type KT, 1200 RPM
1—10 HP Gen. Elec., 1200 RPM
1—7½ HP (Motor) Allis Chalmers, 1150 RPM
1—5 HP Allis Chalmers, 860 RPM
1—1½ HP Gen. Elec., 220/440, 1720 RPM
1—1½ HP Gen. Elec., 220/440 volt, 1720 RPM

MOTOR GENERATOR SET

75 HP Westinghouse 440, 60, 3, 840, direct connected to Westinghouse 50 KW Generator, 125V.

HEAT and POWER Company

45 BOND STREET ALgonquin 4-3874 NEW YORK 12, N. Y.

REBUILT EQUIPMENT—READY TO SHIP

AIR COMPRESSORS

1—599 cfm. Ingersoll-Rand, 100# pres., Imperial 10, type XB-2, horiz., two stage Duplex, double acting, size 16x14x10x14", complete with 104 HP, 220/440 v., 3 ph., 60 cy. AC motor, complete.
1—888 cfm. Ingersoll-Rand, 100# pres., Imperial 10, type XB-2, horiz., two stage Duplex, double acting, size 19x16x12x16", complete with 150 HP, 220/440 v., 3 ph., 60 cy. AC motor, complete.
1—725 cu. ft. National Brake type 3VD, 100# pres. Vert. 3 cyl. single stage 11" bore, 14½" stroke gear driven to A.C. or D.C. Motor.

MINING MACHINES—250 v. DC

1—CE-7 Sullivan 36" gauge.
2—Sullivan 5B Buddy Mining Machines 230 v. DC 5' bar, 2½" kerf.
3—Armatures for CE-7 Sullivan 250 v. D.C.
1—12 AA Goodman 250 v. 36" ga.

MINE LOCOMOTIVES

1—3½ ton Ironton Battery 36" ga.
2—4 ton Jeffrey Gathering 250 v. 36" ga.
5—5 ton Goodman 30 B, 250 v. 36" ga.
1—6 ton Atlas 4000# D.B.P. with AC or DC Motors 36" ga.
2—7 ton Goodman 32-0-4-T 250 v. 36" ga.
1—10 ton Milwaukee Gasoline
1—10 ton West. 250 v. 36" ga.
1—10 ton West. 500 v. 40" ga.
1—12 ton G.E.-53 500/550 v. 42" ga.

RAILROAD CAR PULLER

Drum monitor controller 2 safety switches and 5 HP. D.C. Motor.

CENTRIFUGAL PUMPS

1—2500 GPM Allis Chalmers 95' hd with 75/150 HP. Motor 250 v. D.C.
2—1000 G.P.M. Cameron bronze, 100' hd. 8 x 8.
1—800 G.P.M. Weinman 90' hd. 6 x 5
2—160 G.P.M. Deming Triplex 150# 335' hd. 6 x 8.
1—100 GPM Dayton 46' hd 1700 rpm., with 3 hp. D.C. motor, resistor and Safety Switch mounted on steel wheel buggy.

TRANSFORMERS—1 ph. 60 cy.

No.	Kva.	Prl.	Sec.	Make
1	250	2300	460	G.E.
1	100	2200	110/220	G.E.
3	100	6600	550/440/220	Pgh.
3	50	11430/6600	550	Al. Ch.
3	50	6600	575	G.E.
3	50	Westg.	4000/2200	230/460
1	37½	2300	220/440	Wagner
3	37	4400	185	West. (Rotary)
35	10	2200	110/220	G.E.
100	7½	2200	110/220	G.E.
75	5	2200	110/220	West.

SLIPRING MOTORS—3 ph. 60 cy.

HP	Make	Type	Volts	RPM
300	Westg.	CW-1106	2200	580
250	Westg.	CW	2200	345
100	G.E.	I	220	450
100	Westg.	CI	220/440	1750
75	Cr. Wh.		220/440	875
60	Triumph	C-16	220/440	430
60	Westg.	HF	2200	690
53	G.E.	I	220/550	1165

HOISTS

100 HP, Lidgerwood 2 drum AC or DC Motor

DINGS MAGNETIC CONVEYOR PULLEY

24" D 2" F 250 v. approx wt 3000 lbs.

SCALES

9—Howe No. 2734, 3 beams (2 at 200 lbs.—1 at 50 lbs.) Platform 14½ x 22", cap. 500#.

DIESEL ENGINE GENERATOR SET

1—75 KW, 250 v. DC, type SK Westg Gen. belted to 100 HP Buckeye Horiz. Diesel Engine, complete with swb.

230 V. DC MOTORS

HP	Make	RPM	Type
30	Westg.	1150	SK-110L
35	Westg.	675	SK-140
125	Morg. Gardner	425	———
150	G.E.	500	MPC-6
150	Cr. Wheeler	625	CCD
200	Cr. Wheeler	477	CCD
250	Cr. Wheeler	200/400	CMC
300	Otis	550	———

(With spare armature)

MOTOR GENERATOR SETS

150 Crocker Wheeler 250 v. D. C. 600 rpm., 200/440 or 2300 v. Syn. Motor.
150 KW Ridgeway 250 v. DC, 900 rpm., 2200/3/60, syn.
100 KW Westg. 250 v. DC, 327 rpm., 2200/220 or 440 v., 3/60, syn.

DUQUESNE ELECTRIC & MFG. . . . . PITTSBURGH (6), PA.

TRACTORS—SCRAPERS—DOZERS

1—TRACTOR, Allis-Chalmers, Model L, equipped with front Push Bumper and Electric Starter. $3,031.50
1—BULLDOZER, LaPlant Choate Hydraulic, Model B71, for new type Model D7 "Caterpillar" Tractor $1,225.00
1—TRACTOR AND DOZER, "Caterpillar" Model Fifty Diesel Tractor, equipped with LaPlant-Choate Hydraulic Trailbuilder with front end pump $3,344.00
3—TOURNAPULLS, LeTourneau Super C, 12 cu. yd. capacity, powered by Cummins Diesel Engines, equipped with 21x24 Tires on Tournapull, 2—18x24 Tires on Scraper. Each $10,871.00
1—TRACTOR-SCRAPER OUTFIT, "Caterpillar" Model D8 Diesel Tractor and LeTourneau FP Scraper with Double Drum Power Control Unit. FOR RENT ONLY
1—TRACTOR, SCRAPER AND DOZER OUTFIT, "Caterpillar" D6 (New Style) Diesel, equipped with LePlante-Choate Hydraulic Trailbuilder, Le Tourneau Double Drum Power Control Unit and Bucyrus Erie 4½ yd. Cable Controlled Scraper ..... FOR RENT ONLY
1—TRACTOR AND SCRAPER, "Caterpillar" Model D7 (New Style) Tractor and Le Tourneau Model LS Scraper 11 yd. Heaped with LeTourneau Double Drum Power Control Unit. FOR RENT ONLY
1—TRACTOR AND SCRAPER, "Caterpillar Model D8 and LeTourneau Model FP Scraper with LeTourneau Double Drum Power Control Unit ..... FOR RENT ONLY
1—TRACTOR, Allis-Chalmers Model HD14 Diesel. $6,375.00

HAULING EQUIPMENT

2—CRAWLER WAGONS, Euclid 2 way dump with Hydraulic Adaptors for D8 Tractors, Tracks nearly new. Each $2,500.00
2—TRACTORS AND CRAWLER WAGONS "Caterpillar" Model D7 (New Style) Diesel Tractors and Athey Model EC31, 14 yd. Crawler Wagons, two way side dump with bath tub rack type bodies. Each $8,971.00
Note—There is a quantity of spare parts which must be sold with the above wagons.
3—KOEHRING DUMPTORS, Model WD60, 6 cu. yd. Pneumatic-tired, Diesel powered. FOR RENT ONLY
1—CRAWLER WAGON, LaPlant-Choate Model DW 10, two way dump Rock Type Body. $1,495.00
5—TRACTOR TRUCKS, Euclid, Model 6FDT, 13 yd. water level 15 yd. Heaped, powered by Cummins Diesel Engines, equipped with Air Brakes, 13.50x20 Front Tires, 21.00x24 Rear. Each..$11,645.00

GRADERS—ROOTERS

3—MOTOR GRADER, "Caterpillar" Model No. 12, Diesel, equipped with Scarifier. FOR RENT ONLY
1—MOTOR GRADER, Adams Model No. 511, Diesel, 12 foot Blade and Scarifier....$5,469.00
1—MOTOR GRADER, "Caterpillar" Model No. 112, Diesel, equipped with Scarifier, 12 ft. Blade ..... FOR RENT ONLY
1—GRADER, "Caterpillar" Pull Type, Model 66, Power Controlled, 12 ft. Blade.....$650.00
1—ROOTER, LeTourneau Model H3 Heavy Duty, 3 Tooth ..... FOR RENT ONLY

MISCELLANEOUS ITEMS

1—CRANE-CLAMSHELL COMBINATION, Bucyrus-Erie Model 1035, Serial No. 11196, equipped with 40 ft. Boom, powered by Waukesha Gasoline Engine with Electric Starter.....$8,775.00
1—CLAMSHELL BUCKET, Blaw-Knox size 716, 1½ cu. yd. $862.00
1—DRAGLINE BUCKET, Page 1¼ yd. with Digging Teeth, complete with Ball and Chains. $250.00
1—CLAMSHELL BUCKET, Byers ¾ yd. No. 368. This is an old bucket but in A-1 condition. $575.00
1—PULVERIZER, Gruendler Model 2XA, used less than three months.....$750.00
1—COMPRESSOR, Stationary, Sullivan, Angle Compound, Model WJ-3, 348 cu. ft. actual air, equipped for flat belt drive.....$1,333.00
1—COMPRESSOR, Sullivan, Class WL-60C, 2 stage, 270 cu. ft. capacity, 870 RPM, complete with air tank, A-1 condition. This unit can be adapted to 900 RPM Gasoline or Diesel Engine for Direct Drive $1,000.00
1—ROLL CRUSHER, H & B, 2 roll, 14x20, one plain and one flange roll.....$865.00
1—GENERATOR, Direct Current, Westinghouse, 30 KW, 125 volt, 950 RPM, Compound (not Interpole) $350.00
1—GENERATOR, Direct Curret, Triumph, 22.5 KW, 125 volt, 180 amps, 710 RPM, Compound (not Interpole) $400.00
1—GENERATOR, Direct Current, Jenney, 37.5 KW, 220 volt, 170 amps, 800 RPM, Compound (not Interpole) $400.00
1—TRUCK SCALE, Winslow 15-ton, Model P, 9x18 platform $315.00

800 W. Main St.
Ph. WAbash 1375

ROY-C-WHAYNE SUPPLY COMPANY

LOUISVILLE 2, KENTUCKY

MINE HOISTS

1—Vulcan 30" Band friction will coil 3000 ¾" rope 50 or 60 HP motor.
1—Diamond Band Friction 42" dia. will coil 4000 ft. ⅞" rope—150 hp motor.
1—Connellsville 54" Band friction will coil 5000 ft. ⅞" rope 100 or 150 HP motor.
1—Flory-Keyed drum 52" dia. 150 HP electrical equipment.
1—Vulcan 60" Sliding pinion will coil 3500 ft. 1⅛" rope. 200 HP motor.
1—Lidgerwood-Cylindro Conical Shaft Hoist—225 ft. 1¼" rope. 300 HP motor.
1—Vulcan-Cylindro Conical Shaft Hoist 350' 1⅜" rope. 400 HP motor.
1—Connellsville-Cylindro Conical Shaft Hoist 350' 1½" rope. 800 HP motor.

And other hoists to suit all mining conditions

Jones Mining Equipment Co.

541 Wood Street Pittsburgh, Pa.

REBUILT - GUARANTEED

1—200 KW, 250 V. West. Converter Equipment
1—200 KW, G.E. Rotary Converter
3—165 KVA, G.E. Rotary Transformers
A.C. & D.C. Rotary Control Panels
3—Oxide Film G.E. Lightning Arrestors
Oil & Air Circuit Breakers
1—I/R Portable Air Compressor
Motors: A.C. and D.C.
6—600 Ampere DB-257 Line Contactors
Power, Distribution & Current Transformers
150—5 Ampere, 110 Volt, 2 Wire Meters
3—S & C Oil Filled Fuses with Supports
1—24 Circuit Control Breaker Panel

R. H. BENNEY EQUIPMENT COMPANY
NORWOOD (12), OHIO

Bucyrus-Erie 1¼ yd. gas-air shovels, A-1: (2).
Davenport 19-ton locomotives, stm., 36" ga. (2).
Porter 18-ton locomotive, steam, 36" gauge.
Vulcan 17-ton locomotive, steam, 36" gauge.
Bucyrus 2-yd. 50B Elec. Shovel-Drgl., (West.)
Plymouth 25-ton gas locomotive, std. ga.
Bucyrus 80B steam shovel, 2-yd., 45' bm., cats.
Carryall trailers, 40 and 60 tons, solid tires.
Euclid 6-yd. bottom dump crawler wagons (8).

H. Y. SMITH CO.
828 N. Broadway Milwaukee 2, Wis.

NEW and REBUILT
STORAGE BATTERY
LOCOMOTIVES
1½ to 10 Ton—18" to 56" Track Gauge
GREENSBURG MACHINE CO.
Greensburg, Penna.

MACHINE TOOLS

Lathes, Shapers, Milling Machines, Saws etc. for general maintenance work. We have a knowledge of the shop problems of the mine shop. Write or wire us your inquiries.

Cincinnati Machinery & Supply Co.
217 E. Second St. Cincinnati, Ohio

ELECTRIC LOCOMOTIVES

1—20 T. West. Diesel Elec. Std. gauge.
1—13 T. G. E. with HM-829 250 V. motors.
1—10 T. G. E. with HM-830 250 V. motors.
1—10 T. G. E. with HM-830 500 V. motors.
1— 8 T. Goodman steel frame, 250 V. Type 31-0-4-T.
2— 6 T. Jeffrey MH-88 250 V. motors & reels.
1— 5 T. G. E. with reel, ready to operate.

COAL CUTTING MACHINES

2—29LE Jeffrey 250 V. T.O.H.
1—35B Jeffrey Shortwall, 250 V.
1—35BB Jeffrey 250 V. permissible.
1—35BB Jeffrey A.C.
1—12DA Goodman, 50 HP, 210 V. D.C.
2—12AA Goodman, 250 V. D.C.
2—124 EJ Goodman Slabbing 250 V. D.C.

MISCELLANEOUS

1—67 HP Winton full Diesel Oil Eng. 425 RPM.
1—Slate Larry car.
1—5 x 4½" Deming Gath. Pump with 3 HP DC 230 V. motor.
1—3 x 5 Weinman Gath. Pump, motor driven either A.C. or D.C.
1—100 KW West. Syn. M-G set, 275 V. D.C.

Send us a list of any equipment you may have for sale.

TIPPINS MACHINERY COMPANY
3528 Forbes St. Pittsburgh 13, Pa.

★ MINING EQUIPMENT READY FOR DELIVERY ★

CUTTING MACHINES

1—50-HP. **Goodman Standard**, 250 volt
1—50-HP. **Goodman Universal**, 250 volt
1—36-B **Jeffrey** low vein, 250 volt
2—28-A **Jeffrey** shortwall, 250 volt
1—28-A **Jeffrey** shortwall, 500 volt
1—29-B **Jeffrey** arcwall, 250 volt, top cutter
1—29-B **Jeffrey** arcwall, with 29-C motor, 250 volt top or bottom cutter
1—CE-7 **Sullivan** shortwall, 220 volt A.C.
2—CE-7 **Sullivan** shortwall, 250 or 500 volt
1—35-A **Jeffrey** shortwall, 250 volt
6—12-G3 **Goodman** machine motors complete, 220-440 volt A. C.
2—12-A **Goodman** machine motors comp. 250 volt
1—35-B **Jeffrey** machine motor comp. 250 volt
3—212-G3 **Goodman** machine motors comp. 220-440 volt A.C.
Machine armatures for sale 35-BB, 28-A, 35-B, 35-L, 29-C, 12-A, 12-AA, 12-AB

LOCOMOTIVES

1—10-Ton **Jeffrey**, MH-78, 250 volt, 42-44" gage, like new
1—13-Ton **Westinghouse**, type 79, 250 volt, 48" gage
1— 6-Ton **Ironton**, 250 volt, low vein with cable reel
1— 4-Ton **G.E.** HM-825, 250 volt, low vein with cable reel
2— 4-Ton **Jeffrey** MH-96, 250 volt, 42 to 48" ga. with reels

SUBSTATIONS—POWER PLANTS

9—KW. **West.** M-G set, 250 volt D.C. 220 volt A. C.
75—KW. **West.** M-G Set complete, 2300 volt Sync. motor, 275 volt Generator
100—KW. **G. E. Rotary converter**, type TC-6, 250 volt, comp. with switchboard
200—KW. **Westinghouse** M-G Set comp. 2300 volt A.C. 275 volt D.C.
200—KW. **G.E. Rotary converter** comp. 2300 volt A.C. 275 volt D.C. type TC-6
150—KW. **Jeffrey Generator** only, 250 volt
100—KW. **Westinghouse SK-180 generator** only 250 volt
62½—KVA. **G.E. alternator**, 220 volt, with 100-HP. natural gas engine

HOISTS

35-HP. **Ottumwa**, single drum, will spool 2300' of ⅝" rope
60-HP. **Thomas Elevator** single drum, will spool 3000' ¾" rope

MISCELLANEOUS

1—5 x 8' **Fairmont** double deck **vibrating screen**
2—Fig 8 **Rope** drums complete
2—7½-KVA. **G.E. Transformers**, 2300 to 115-230 volt
3—10-KVA. **G.E. Transformers**, 2300 to 110-220 volt
3—**Goodman Duckbills** comp. size #1
1—300-HP. **G. E. Auto-Starter**, 2300-4000 volt A.C. and D.C. motors, controllers, compensators

LET US KNOW YOUR NEEDS—WE BUY, SELL, AND TRADE

ALL-STATE EQUIPMENT CO., INC.
LOGAN, W. Va. PHONE 884

FULLY REPAIRED LOCOMOTIVE

Available Immediate Delivery

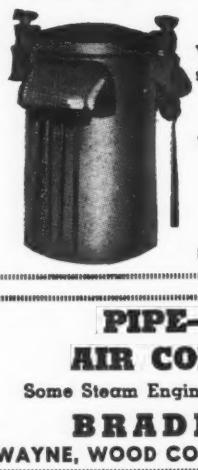
0-4-0 SADDLE TANK—32½ TONS
STANDARD GAUGE
BUILT 1917
BOILER—ASME

TRACTIVE EFFORT 14,400 lbs.
LOCATION: CINCINNATI, O.,

ALSO: HOPPER, BOX, FLAT, AND GONDOLA CARS

RAILWAYS ACCESSORIES CO.
4100 Carew Tower, Cincinnati, O.

-TRANSFORMERS-



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We have several thousand transformers in stock for prompt shipment, and invite your inquiries.

PIONEER TRANSFORMER REBUILDERS

We rewind, repair and redesign all makes and sizes.

One Year Guarantee

THE ELECTRIC SERVICE CO., INC.
"AMERICA'S USED TRANSFORMER CLEARING HOUSE"
STATION M Since 1912 CINCINNATI 27, OHIO

PIPE—MACHINERY—GAS ENGINES
AIR COMPRESSORS—DIESELS—PUMPS

Some Steam Engines and Boilers available only slightly above the metal price

BRADFORD SUPPLY COMPANY
WAYNE, WOOD COUNTY, OHIO Near Toledo

FOR SALE

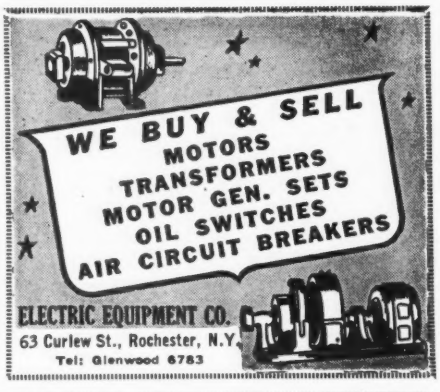
1—One **NORDBERG** Hoist No. 06392, 4 ft. drum, hydraulic brake direct connected 150 h.p., G.E motor AC, 440 v. 3 ph. 60 cycle, speed 585, complete with panel board and ammeter.

3—One **POMONA** Vertical Pump, 75 h.p., AC, 250 v. 60 cy. 3 ph. Westinghouse motor, together with starting compensator, capacity 1000 gal. per min., 200 feet head.

4—One **ALLIS CHALMERS** Pump, type BS 13406, 100 h.p., motor AC, 220 v. 60 cy., 3 ph., capacity 1000 gal. per min., 250 feet head.

All of the above equipment in first class operating condition

FS-200, Coal Age
520 No. Michigan Ave., Chicago, Ill.



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Large stocks, all sizes
attractive prices

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Slip ring, 125 H.P., F-M, 3 Ph., 60 Cy., 440 V., B/B, 1750 RPM; with drum type controller and resistance. Very attractive price.

The Industrial Equipment Corp.
P. O. Box 1647 Pittsburgh 30, Pa.
Warehouse: Carnegie, Pa.

FOR SALE

DINGS MAGNETIC PULLEY

New equipment—Never been installed.
Size 24" D x 32" F—250 Volts.

AMERICAN ZINC COMPANY
OF TENNESSEE
Paul Brown Building St. Louis, Mo.

MINE EQUIPMENT for sale including:

400 H.P. Electric Hoist with Conical Drum. Grooved for 1⅛" Rope.
Approximately 125 Wood Mine Cars, 36" gauge, 1½ ton capacity.
2—7½ Ton Goodman Electric Locomotives.
Steel Rail and other material.
Can be inspected Nortonville, Kentucky.

NORTON COAL CORPORATION
NORTONVILLE, KY.

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OF
RUBBER PRODUCTS

Conveyor Belting...Transmission Belting...Elevator Belting...Fire, Water, Air, Steam, Suction or Welding Hose, etc.

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CARLYLE
THE RUBBER HEADQUARTERS

CARLYLE RUBBER PRODUCTS ARE NEW, GUARANTEED & LOW PRICED

CONVEYOR BELTING

ABRASIVE RESISTANT COVERS

Width	Ply	Top-Bottom	Covers	Width	Ply	Top-Bottom	Covers
48"	8	1/8"	1/16"	20"	5	1/8"	1/32"
42"	5	1/8"	1/16"	20"	4	1/8"	1/32"
36"	6	1/8"	1/16"	18"	4	1/8"	1/32"
30"	6	1/8"	1/16"	16"	4	1/8"	1/32"
30"	5	1/8"	1/16"	14"	4	1/16"	1/32"
24"	5	1/8"	1/32"	12"	4	1/16"	1/32"
24"	4	1/8"	1/32"				

Inquire For Prices - Mention Size and Lengths

TRANSMISSION BELTING

HEAVY-DUTY FRICTION SURFACE

Width	Ply	Width	Ply	Width	Ply
18"	6	10"	6	6"	5
16"	6	10"	5	5"	5
14"	6	8"	6	4"	5
12"	6	8"	5	4"	4
12"	5	6"	6	3"	4

Inquire For Prices - Mention Size and Lengths

ENDLESS "V" BELTS

"A" WIDTH All Sizes | "D" WIDTH All Sizes
"B" WIDTH All Sizes | "E" WIDTH All Sizes
"C" WIDTH All Sizes | Sold in Matched Sets

Inquire For Prices - Mention Size and Lengths

PROTECT THAT PLANT
FIRE HOSE

APPROVED SPECIFICATION HOSE
EACH LENGTH WITH COUPLINGS ATTACHED

Size	Length	Per Length
2½"	50 feet	$28.00
	25 "	16.00
2"	50 "	23.00
	25 "	13.00
1½"	50 "	20.00
	25 "	11.00

Specify Thread On Couplings

SPECIAL OFFER . . . HEAVY DUTY
RUBBER HOSE

WATER HOSE
Each Length with Couplings Attached

I.D. Size	Length	Per Length
¾"	25 feet	$4.25
1"	50 "	8.00
	25 "	6.25
1¼"	50 "	12.00
	25 "	7.50
	35 "	10.50
	40 "	12.00
1½"	50 "	15.00
	25 "	10.00
	35 "	14.00
	50 "	20.00

AIR HOSE

I.D. Size	Length	per Length	Couplings
½"	25 feet	$5.00	$1.50 Pair
	50 "	10.00	1.50 "
¾"	25 "	6.25	2.50 "
	50 "	12.50	2.50 "
1"	25 "	10.00	3.50 "
	50 "	20.00	3.50 "

LARGER SIZES ALSO AVAILABLE
All Prices—Net—F.O.B. New York

CARLYLE RUBBER CO., INC.
62-66 PARK PLACE NEW YORK, N. Y.

6 YD. or 8 YD.
STRIPPER SHOVEL

225 Bucyrus 80 ft. Boom, 54 ft. Dipper Stick, Steam Shovel.

2-4 Yds. SHOVELS

2 Marion Model, 125, Electric, 35' Boom. 25' Dipper Sticks

16 YD. DRAGLINE:
1—16 Yd. Electric Caterpillar Modern Dragline with 160' Boom

AIR COMPRESSORS:
(7) Steam 66 ft., 200 ft., 600, 1000 & 1940 ft.
(12") Belted, 360, 676, 870, 10000, 1300 ft.
(12) Diesel 105, 315, 520, 676 & 1000 ft.
(6) Electric, 1300, 1500, 2200, 2000, 5000 ft.
(14) Gasoline, 10, 160, 220, 310 & 370 ft.

RUBBER CONVEYOR BELTS:
1000' 60", 600' 30", 300' 20", 1000' 42", 900' 48", 1450' 36", 1200' 24", 900' 18", 600' 16", 350' 14".

TANKS:
12,000 and 15,000 gal. and 20,000 gal.

CONVEYOR PARTS:
Idlers, Heads & Tail Pulleys, Steel Frames, Tripper, etc., 14 In., 6 In. Large stock here.

STORAGE BATTERY LOCOMOTIVES:
2½ ton Witcomb 24 ga. New Batteries
2—4 ton G.E. 30 in. ga.
3—5 ton Mancha 30 in. ga.
4—5 ton G.E. 36 in. ga.
3—7 ton Goodman 36 ga. Battery & Trolley
8—6 ton Baldwin Westgh. 42 ga. & 36 ga.

TRACK SCALE:
150 Ton Buffalo 56 ft. R.R. Track Scale

TROLLEY LOCOMOTIVES:
2½ ton Westinghouse 24 ga.
4—6 ton & 3—5 ton Goodman 36 ga.
3—6 ton Goodman 30 ga.
4—6 ton Goodman 42 ga.
5—6 ton Westinghouse 42 ga.
2—8 ton Goodman 36 ga.
10 ton Goodman 42 ga. & 13 ton Jeffrey

VIBRATING SCREENS:
9 Tyler Hummer 3x6,4x5, 4x8 & 4x10
2 Robins Gyrex 4x8½
4x12 Niagara, 3x8 L. B., 5x6 Simplex

CARS:
60—Western 16-20-30 yd. Side Dump

SHOVELS, CRANES & DRAGLINES:
1 yd. K 30 Link Belt 50' Boom Crane
2 yd. Page 70' Boom Diesel Dragline
1¼ yd. Marion 450 Elec. Shovel
1½ yd. Lima Diesel Shovel & Dragline
25 ton Browning 50' Boom Loco. Crane

MINE LOADERS:
Junior Joy 36 ga. Low Pan
3—5 BU & 7 BU & 12 BU 36 or 42 ga. Joy
7 Conway 20A, 30A, 50A, 60 & 75 Muckers

MISCELLANEOUS:
5'x160' Traylor Rotary Dryer
Clamshell Buckets ¾ ; 1, 1½ & 2 yd. Cap.
30 ton & 12 ton Vulcan St. Ga. Gas. Loco.

WANTED TO BUY:
Complete Mines—M.G. Sets, Locomotives, Compressors, Conveyors, Cranes, Crushers, Mine Loaders

R. C. STANHOPE, INC.
60 East 42nd St. New York, N. Y.

COMPRESSORS

300 CFM Chi. Pneu. with 75 H.P. motor
526 CFM Ingersoll-Rand, Style "JC"
940 CFM Ingersoll-Rand 10 horiz. 2-st. steam driven with receiver

CRUSHERS

24" x 54" Superior Crushing Rolls
#3 McCully Gyratory
#6 McCully Gyratory

HOISTS

8—American Hoist & Derrick Co. double drum, motor driven with 40 H.P. A.C. motors

MOTORS

125 H.P. G. E. Type I-12-125A, 600 RPM, complete with controller, etc.

IRON & STEEL PRODUCTS, INC.
13484 S. Brainard Ave., Chicago 33, Illinois
"Anything containing IRON or STEEL"

GOOD NEWS!
WPB Revokes Freeze Order On Relay Rails
No Priority or Release Now Required

60# - 70# - 80# - 85# - 90# - 100# - 110#

and Other Sizes Now Available Spot Shipments
Also Cars, Railroad Equipment, Car Parts, Tubes
New and Used Merchant Steel

HYMAN-MICHAELS COMPANY
122 SOUTH MICHIGAN AVENUE CHICAGO 3, ILLINOIS
St. Louis — San Francisco — Portland, Ore. — Los Angeles — Norfolk, Va. — New York

IMMEDIATE SHIPMENT

200 Ton—Niles Hydraulic Wheel Press
28 x 36—Link Belt D. R. Coal Crusher
150 KW—Belted D. C. Generator—250 Volts
125 KW—Ridgway Engine Generator Set—250 Volts
1000 KW—Westgh. Synchronous Rotary—250 Volts D. C.—C.W. Interpole—6 Phase—60 Cycle with 1100 KVA Transformer—Switchboard
625 KVA—Genl. Elect. Generator 3/60/480 Volts. Direct connected to 24x42 Simple Corliss Engine

ARTHUR S. PARTRIDGE
415 Pine St. Louis

COAL AGE ADVERTISERS IN THIS ISSUE

An asterisk preceding manufacturer's name indicates detailed information may be found in the 1943 *COAL MINING CATALOGS*

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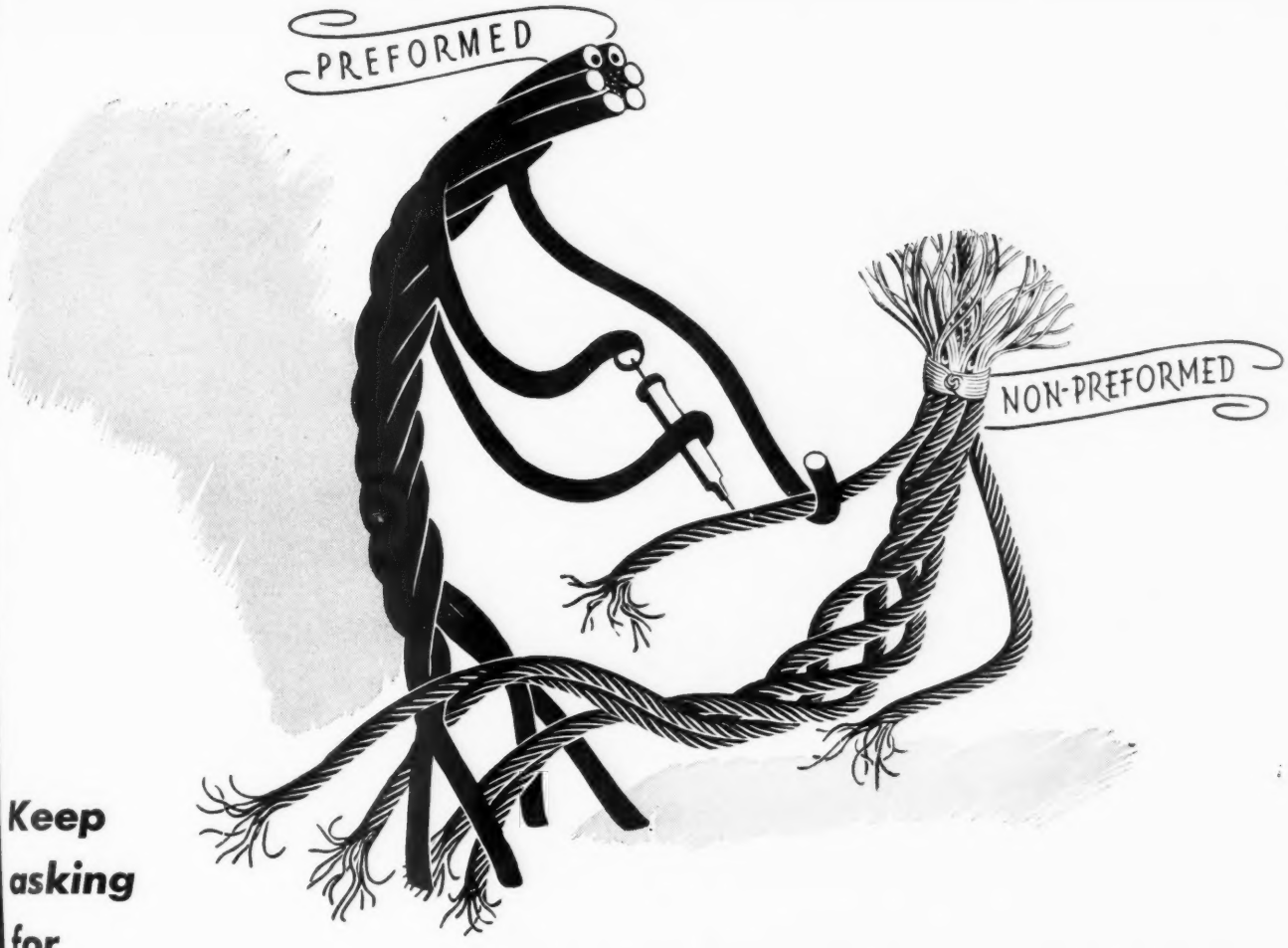

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